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Enterprise Resource Planning Business Case Considerations:
An Analysis of Small to Medium-Sized Enterprises in
Developing Countries

A thesis submitted in partial fulfilment of the requirements for
the degree of

Master of Commerce in Information Systems (INF5005W)
by

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Abstract

Small and Medium-Sized Enterprises (SMEs) are implementing Enterprise Resource Planning (ERP) systems because they promise significant benefits. However, the majority of ERP deployments rarely meet user expectations and often do not yield expected benefits. As a result, the failure rate of ERP implementations at SMEs is estimated to be between 40 and 60 percent. This high rate of failure, together with the resultant impact on SMEs and the consequences for national development is a cause for concern. In order to address this concern, this study aims to explore how SMEs develop their business cases, as well as how the benefits, risks and costs of ERP systems are realised in SMEs. Companies need a clear vision and convincing reasons when they adopt ERP systems.

The study used the qualitative research method. Cases from South Africa and Zimbabwe were investigated in a cross-sectional study. Data was collected through semi-structured interviews and analysed using elements of thematic data analysis, grounded theory, and a general inductive approach to analysis. The Design Reality Gap Model formed a theoretical base and was used as lens for data collection and analysis.

Findings revealed that SMEs do not develop a business case before investing in ERP systems due to factors such as inadequate preparation, lack of manpower, and insufficient time. This study integrated various business case elements, and distilled a set of considerations which SMEs can use to develop realistic business cases when adopting ERP systems. An analysis of how ERP benefits are realised revealed that risks influence the realisation of other risks and benefits influence each another as well. As a result, causally-related benefits and risks emerged from the study.

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Chapter 1: Introduction

With the passage of time, the implementation rate of Enterprise Resource Planning (ERP) systems is increasing (Nafeeseh and Al-Mudimigh, 2011; Sammon et al., 2004). Initially, it was Large Enterprises (LEs) that implemented ERP systems, but Small to Medium-Sized Enterprises (SMEs) have also started implementing them (Everdingen et al., 2000; Seethamraju and Seethamraju, 2008).

However, three quarters of the ERP deployments fail to produce desired results (Rasmy, et al., 2005). Approximately, 70 percent of the implementations rarely meet user expectations and frequently fail to yield expected benefits (Al-Mashari, 2000; Wang et al., 2007). In addition, about 90 percent of ERP deployments are delivered late or they run over budget (Martin, 1998). As a result, the failure rate of ERP implementations is high. It is estimated to be between 40 and 60 percent (Liang et al., 2007).

As a step in addressing this concern, this study aimed to explore SME ERP business case considerations and how SMEs justify their ERP investments. Currently, business case considerations of SMEs attracted to ERPs are veiled in obscurity. The study sought to bring these to light by investigating the initial business case considerations of SMEs as compared to actual outcome after implementation.

The study adopted a qualitative research method. Data was collected through semi-structured interviews and analysed using elements of thematic data analysis (Braun and Clarke, 2006; Fereday and Muir-Cochrane, 2006), grounded theory (Jones and Alony, 2011; Strauss and Cobin, 1998), and a general inductive approach to analysis (Thomas, 2003). In order to gain an in-depth understanding of the business case considerations in a developing country, the study focused on cases in sub-Saharan Africa. Cases from South Africa and Zimbabwe were investigated.

The theoretical base of the study was in The Design Reality Gap Model. It provided a lens for both data collection and analysis, and helped integrate business case considerations for SMEs adopting ERP systems. Furthermore, it helped explain current practises around the development of business case in SMEs.

1.1 Definition of terms

This section defines terms used in this thesis. These include: Small to Medium-Sized Enterprises (SMEs); Enterprise Resource Planning (ERP) systems; and Business Case considerations.

1.1.1 Small to Medium-Sized Enterprises (SMEs)

Although the European Commission (2005, p. 6) argues that, *“It is essential that measures in favour of SMEs are based on a common definition to improve their consistency and effectiveness and to limit distortions of competition”*, in practice there is no universally-accepted definition for an SME (Abor, 2010). Definitions vary from one country to another, depending on the country's level of development (Organisation for Economic Co-Operation and Development (OECD), 2004).

Countries define SMEs according to staff headcount, annual revenue turnover and capital assets (annual balance sheet) (OECD, 2004). Also, some authors have defined SMEs in terms of legal status and method of production (Abor, 2010). Generally, SMEs have been defined as those companies whose headcount and annual turnover fall below certain thresholds, which vary from country to country.

The broad category of small businesses encompasses Small, Micro and Medium Enterprises (SMMEs). However, the primary focus of this study is on small and medium-enterprises and excludes the micro-sector. Thus the acronym ‘SME’ is used throughout. It is also important to note that, in some instances, a company may exceed either the annual revenue limit or the balance sheet limit without losing its status. The European Commission, (2005, p. 13) in its definition of an SME, stated that, *“It is necessary to note that while it is compulsory to respect the staff headcount thresholds, an SME may choose to meet either the turnover or balance sheet ceiling. It does not need to satisfy both and may exceed one of them without losing its status”*. For the purpose of this study, SMEs were defined according to the country in which they were situated.

1.1.2 How are SMEs defined in South Africa?

In South Africa, a small business is defined by the number of employees, size of market share and capital investment. They are defined as follows:

- Micro is a company with less than five employees;
- Small is a company which employs less than 50 workers; and
- Medium is a company which employs between 50 and 200 workers (The National Small Business Amendment Bill Gazette, 2003).

National Small Business Amendment Bill Gazette (2003) definitions are summarised in Table 1.

Table 1: Small Business Act's definitions of SMEs

Enterprise Size	Number of Employees	Annual Turnover	Gross assets, excluding fixed property
Medium	Fewer than 100 to 200 depending on industry	Less than R4 million to R50 million, depending on industry	Less than R4 million to R18 million, depending on industry
Small	Fewer than 50	Less than R2 million to R25 million, depending on industry	Less than R2 million to R4.5 million depending on industry
Very Small	Fewer than 10 to 20, depending on industry	Less than R200 000 to R500 000, depending on industry	Less than R150 000 to R500 0 000, depending on industry
Micro	Fewer than 5	Less than R150 000	Less than R100 000

This study focused on the manufacturing and distribution industry sectors. The definitions for these industry sectors are given in the Table 2. These definitions are based on the South African National Small Business Amendment Bill (2003) published in the Government Gazette.

Table 2: Definition of an SME according to industry sector (Small Business Act Amendment Bill, 2003)

Sector or subsector in accordance with the Standard Industrial Classification	Size of class	Total full-time equivalent of paid employees less than	Total annual turnover less than	Total gross asset value(fixed property excluded) less than
Manufacturing	Medium	200	R40.00m	R15.00m
	Small	50	R10.00m	R3.75m
	Very Small	20	R4.00m	R1.50m
	Micro	5	R0.15m	R0.10m
Wholesale Trade	Medium	120	R50.00m	R8.00m
	Small	50	R25.00m	R4.00m
	Very Small	10	R5.00m	R0.50m
	Micro	5	R0.15m	R0.10

1.1.3 How are SMEs defined in Zimbabwe?

In Zimbabwe SMEs fall under the broader category of Small, Micro and Medium Enterprises (SMMEs) and are defined according to the:

- Number of employees;
- Total net assets; and
- Legal structure.

The Government of Zimbabwe (2000), through the Zimbabwe Association of Microfinance Institutions (ZAMFI), defined an SME as: *“one that employs not more than 50 people with assets of less than Z\$3.0 million, and acts as a registered entity. Medium enterprises employ up to 100 people with a capital base of between Z\$7 million and Z\$12 million”*. For the purposes of this study, this definition will be used. However, the revenue aspect will be ignored since the country dollarised its currency in 2009.

1.1.4 Enterprise Resource Planning (ERP) systems

An ERP system is a business software package which allows a company to:

- Integrate and automate the majority of its business functions and processes such as finance, marketing, human resources, logistics and sales.
- Share data and common practise across the entire enterprise.
- Have a single locus for accessing information in a real time environment (Deloitte Touche Tohmatsu, 1999; Minahan 1998).

An ERP can replace several stand-alone systems and is intended to deliver a significant improvement in the performance of the organisation. The high degree of business integration and the all-encompassing nature of an ERP system distinguish it from all other systems and technologies.

There are two ERP system types: ERP I and ERP II. ERP I integrates back-office information systems while ERP II integrates a company with its customers and suppliers (Bond et al., 2000; Weston, 2003). Eckartz et al. (2009) argue that knowing the difference between them is important for predicting costs and benefits in a business case.

1.1.5 Business Case and Business case considerations

There are several definitions of a business case in the literature. However, they all point towards one thing; a business case is a tool for justifying an investment. According to Eckartz et al. (2009) a business case is defined as a business proposal developed to establish the costs and benefits of a project venture. The business dictionary.com defined a business case as, *“A type of decision-making tool used to determine the effects a particular decision will have on profitability.”* This study adopts the following definition: *“The document (business case) provides the context for an investment decision, a description of viable options, analysis thereof, and a recommended decision. The recommendation describes the proposed investment and all of its characteristics, such as benefits, costs, risks, time frame, change requirements, impact on stakeholders, and so forth”* (Treasury Board of Canada Secretariat Business Case Guide, 2008, p.7). Thus for the purposes of this research,

the term 'business case considerations' will only include benefits, risks and costs considered for an ERP adoption.

1.2 Background and problem definition

ERP systems promise significant benefits to companies that implement them (Shang and Seddon, 2000). However, Eckartz et al. (2009) argue that figuring out the benefits achieved as a result of implementing an ERP system is difficult because some of the benefits emanate from the way the system has been implemented and how the organisation uses it. Furthermore, several benefits may not be achieved due to neglected management of organisational change during the implementation process (Davenport et al., 2001). In an investigation of benefits realisation, it was found that more than 70 percent of ERP implementations fail to realise their predicted benefits (Al-Mashari et al., 2006; Stefanou, 2001). As a result, there are misplaced concerns with the performance of ERP systems and their ability to achieve desired benefits (Sammon et al., 2004).

In addition to the challenge of identifying ERP benefits, the implementation of an ERP system has hidden costs (Yusuf et al., 2004). Tarn et al. (2002) argue that cost is a crucial aspect of an ERP implementation to every organisation irrespective of size. Both authors argue that during an ERP implementation, the overall cost may be underestimated due to costs that are hidden. Likewise, ERP implementation projects suffer from being unable to identify and estimate costs due to a lack of proper representation of cost factors (Daneva, 2004; Seddon, 2003; Stensrud, 2001). In the majority ERP projects, direct IT and indirect costs rose above anticipated figures (Love et al., 2005).

Although ERP systems provide significant benefits to organisations, their implementation may come with risks, yet most project managers consider the task of risk management to be additional work and expense (Kwak and Stoddard, 2004). Consequently, a common reason cited for project failures is that managers do not manage risks in their projects (Mark et al., 1998). Several models such as Risk Diagnosing Methodology, Characteristics analysis method (CAM), Safe methodology

(a method to understand, reduce and accept project risk) and PMI (a Guide to the Project Management Body of Knowledge) have been proposed to ensure effective risk management. However, these models have been criticised for being too 'general' to be used for ERP implementations (Aloini et al., 2007).

Having briefly looked at the challenges involved in the implementation of an ERP system, the question is: How do companies justify their ERP projects? For many years, the success rate for Information Technology (IT) investments has been fixed at 30 percent and recent studies argue that this figure is optimistic (Ward et al., 2008). What is not certain is whether the low success rate is a result of overstating the benefits in a business case to secure funding, or is a result of benefits not being achievable. Some organisations indicated dissatisfaction with their ability to identify potential benefits upfront (65 percent of the studied sample) and to quantify the financial value of the benefits (69 percent of the studied sample) when building a business case (Ward et al., 2008). In line with this finding, James and Wolf (2000, p. 101) mentioned that, *"Many of the benefits that we are able to achieve today could not have been predicted at the time that we started work on ERP"*.

The poor understanding of how benefits, risks and costs are predicted and realised when SMEs adopt ERP systems is hypothesised to be one of the key factors reducing implementation success rates. The literature contains many descriptions of potential benefits, risks and costs of implementing ERP systems. However, the way in which benefits influence the realisation of other benefits and the way in which risks influence the realisation of other risks is still not clear.

Companies need a clear vision and a convincing justification when they adopt ERP systems (Nafeeseh and Al-Mudimigh, 2011) to increase their chances of success. Yet because this is often unrealistic, the majority of ERP deployments rarely meet user expectations, frequently run over budget, and often do not meet the stated business benefits. Ward et al. (2008, p. 14) argued that, *"Producing consistently robust business cases through a comprehensive and rigorous approach to identifying and quantifying the benefits, enables organizations to make more informed decisions about which IT investments to make"*.

1.3 Research objectives

The aim of the study was to explore and describe business case considerations for SMEs adopting ERP systems in developing countries. The intention was to gain an in-depth understanding of business case considerations such as benefits, risks and costs. The objectives may be broken down as follows:

1. *To explore benefits, costs and risks that SMEs expected to realise prior to an ERP implementation.*
2. *To explore benefits, costs and risks that were actually realised after the implementation of an ERP system.*
3. *To explore which benefits, costs and risks were realised unexpectedly*
4. *To establish how benefits influence the realisation of other benefits.*
5. *To develop an explanatory model of how benefits influence each other.*
6. *To establish how risks influence the realisation of other risks.*
7. *To develop an explanatory model of how risks influence each other.*
8. *To explain the current ERP system business case development practice in SMEs.*

1.4 Research questions

Based on the research objectives formulated in the previous section, the research will answer the following questions:

The primary research question is:

How are benefits, risks and costs of adopting ERP systems realised by SMEs?

The secondary research questions are:

1. *How is the ERP business case developed in SMEs?*

2. *What are the business case considerations for SMEs adopting ERP systems?*
3. *What influences current business case development practices in SMEs?*
4. *What is the gap between the expected benefits, costs and risks and the realised benefits, costs and risks?*
5. *How do benefits influence the realisation of other benefits?*
6. *How do risks influence the realisation of other risks?*
7. *How can SMEs adopting ERP systems develop realistic business cases?*

1.5 Significance of the study

SMEs play a pivotal role in sustaining the economies of developing countries. Yet despite this important contribution, they face a number of challenges which hinder them from operating at full capacity. Among other challenges, they suffer from lack of finance, managerial expertise; access to international markets, equipment and technology problems (Aryeetey et al., 1994; Diale, 2009). Focusing on technology problems only, SMEs suffer from limited access to appropriate technologies and information (Aryeetey et al., 1994). Aligned to the technology problem is the ERP implementation predicament. The high rate of failure of ERP adoptions by SMEs and the resultant impact on national development is a cause for concern. This study, therefore, will provide SMEs with detailed ERP business case considerations with a focus on assisting them to make sustainable ERP investments.

Dixit and Prakash (2011, p.82) argue that “*some SMEs who have implemented ERP earlier have failed. This has led SMEs to believe that ERP implementations are a waste of time and effort and can even lead to the demise of company*”. This finding shows that there is a compelling need to increase the success rate of ERP implementations as argued by Nafeeseh and Al-Mudimigh (2011), especially in SMEs. In response to the identified need, this study seeks to make business case considerations known upfront to SMEs adopting ERP systems. It is important for researchers to understand how ERP project investments are approached and

justified by organisations (Sammon and Adam, 2007). Davenport (2000) argues that developing a business case is necessary in order to understand how maximum benefits can be realised. In addition, due to the rise of ERP expenses, the need to justify their investment through a business case as the initial step of implementation has become apparent (Al-Twairish and Al-Mudimigh, 2011). It is known that the nature and intensity of preparing the business case has a profound effect on the outcome of an investment (Peppard et al., 2007). Hence, there is a need to research business case considerations for SMEs adopting ERP systems. The significance of this study is therefore to integrate various business case elements from those organisations investigated and to come up with a set of considerations which SMEs can use to develop a realistic business case for an ERP system adoption.

While there has been much research on ERP systems in the context of LEs, little effort has been made to study them in the context of SMEs (Aloini et al., 2007). Due to the significant differences between SMEs and LEs, the results of studies on LEs cannot be easily generalised to SMEs (Thong, 1999). This study therefore seeks to contribute to the body of knowledge about SMEs, ERP systems and business cases. It attempts to fill an urgent gap in the literature.

The study was carried out in Sub-Saharan Africa and findings brought context specific issues to light, such as the challenges which SMEs face in this environment. Such information is relevant to industry practitioners. Also, the study confirmed that The Design Reality Gap Model can be used as a lens to analyse realised benefits, risks and costs in SMEs that adopt ERP systems in this context.

1.6 Research scope and context

The context of the study was limited to SMEs operating in South Africa and Zimbabwe. Both countries fall in the Sub-Saharan Africa region where SMEs play a significant role in economic growth and sustainable development (Kachembere, 2011). The SMEs investigated were in the manufacturing and or distribution industry sectors.

The objective of the study was not to evaluate whether the ERP implementation was a failure or a success. Also, the study did not calculate Return on Investment (ROI). The focus was solely on the contents of the business case. The investigation sought to investigate what benefits, risks and costs the SMEs expect to realise prior to implementing an ERP system, what was actually realised and what was not realised. In addition, the study considered how the realised benefits influenced the realisation of other benefits and how realised risks influenced the realisation of other risks. Unexpected realisations were also considered.

Admittedly, business case considerations vary with each company as companies have unique business requirements and they operate in different contexts. The study therefore investigated those considerations which are universal to every company implementing an ERP system.

1.7 A brief overview of the thesis

This dissertation is organised as follows: Chapter 2 is a literature review covering general topics in IT investments, IT business cases, SMEs, ERP business cases, ERP systems, ERP costs, ERP risks and benefits and looks at some ERP business cases in SMEs. Chapter 3 provides an overview of the research methodology and the research strategy used in this study. It also describes the target population and study sample and looks at the ethical considerations involved in this study. Chapter 3 also describes the steps followed in the data collection and analysis. The findings and interpretation are discussed in chapter 4, which also outlines the limitations of the study. Conclusions drawn from the study and anticipated contributions to this field of research are presented in Chapter 5.

Chapter 2: Literature Review

This chapter comprises a review of the literature. In accordance with the main focus of the research, the literature review covers: work on the significance of SMEs in developing countries; the ERP market in this sector; current ERP business case practice; potential ERP benefits; potential ERP cost elements; potential ERP risks; and research gaps. The chapter concludes with a discussion of the research model (the Design Reality Gap Model). The review begins with a discussion at the economic significance of SMEs in developing countries.

2.1 SME Sector and development

The role of the small business sector is acknowledged throughout the world irrespective of the level of economic development (OCDE, 2002). However, SMEs are more important to developing nations, such as Zimbabwe where levels of poverty and unemployment are high (Chidoko et al 2011). SMEs have the potential to generate employment and upgrade human capital (Berry et al., 2002; Zoephel 2011).

SMEs are regarded as a catalyst for achieving economic growth (Abor and Quartey, 2010). For example, in South Africa, SMEs account for between 52 and 57 percent of the national Gross Domestic Product (GDP), while contributing to approximately 61 percent of the total employment sector (Berry et al., 2002). As a result, SMEs form the backbone of the South African economy. In Zimbabwe, the significance of SMEs has been acknowledged as the Government of Zimbabwe (2008) expected SMEs to address the problem of unemployment and lack of foreign investment. In Ghana, SMEs contribute approximately 70 percent of the GDP of that country, and over 80 percent of total employment (Abor and Quartey, 2010).

The following section presents a review of the ERP market among SMEs to give an insight into how these businesses are a potential market for the ERP product and, subsequently, how ERP adoption can impact the development of developing nations.

2.2 The ERP SME Market

According to an industry report by Hamerman (2008), the ERP market is growing at an annual rate of 6.9 percent. The increase in implementations can be attributed to a range of factors. ERP systems promise multi-dimensional benefits. In addition, ERP systems are not industry specific. They can be implemented in various industry sectors such as chemicals, information technology (IT), electronics, textiles and the public sector (Chang and Gable, 2001; Holland, Light and Kawalek, 1999; Sammon et al., 2004).

The ERP market for large corporates has reached saturation point with a higher than 70 percent adoption rate (Deep et al., 2008). As a result, many ERP vendors are banking their future growth on SMEs. SAP, with its goal of doubling its market limit, is one of the of the ERP vendors that considers SMEs as a potential source of growth (Adams et al., 2008). Factors attracting SMEs to ERP systems include the advent of the electronic business marketplace, which has pushed SMEs to join the supply chain network, to build partnerships with LEs and to develop effective channels of communication (Aloini et al, 2007; Seethamraju and Seethamraju, 2008; Poba-Nzaou et al., 2008; Wang et al 2006).

ERP vendors had to modify their standard products to offer low-cost ERP systems with capabilities geared to SMEs (Wang et al., 2006). These tailored products include examples such as ACCPAC for Small to Medium-sized Enterprises, SAP Business One, and Oracle's eBusiness. Also, the availability of reasonably low-priced hardware and fairly cheap hosting services has attracted SMEs to adopt ERP systems. Generally, the cost of information systems is falling and financially-strained SMEs are finding it more affordable to implement ERP systems (Gable and Stewart, 1999; Seethamraju and Seethamraju, 2008). Considering these factors and the benefits which ERP systems promise, SMEs are likely to migrate from their legacy systems to ERP systems.

2.3 ERP Business case practice

The purpose of a business case is to examine the business needs (resources and capital investment necessary) and to make a case for capital funding (Robertson, 2004). This is where all the project facts are tied together to build a meaningful story. While business cases are designed to secure funding approval, they can also be used for effective project management to facilitate the identification of priorities for the distribution of resources and funds; to form a benefits realisation plan; and finally to secure the commitment of management (Ward et al., 2008; Sammon and Adam, 2007).

The process of building a business case for IT investments has become a common practice in organisations (Eckartz et al., 2009; Ward et al., 2007). However, not many companies are able to build a robust and convincing business case (Ward et al., 2008). Despite the importance of business cases in IT investments, there are few research studies that focus on the ERP business case (Al-Twairish and Al-Mudimigh, 2011). Moreover, studies that focus on business cases in the SME sector are even scarcer.

2.4 Potential ERP Benefits

Eisenhardt, (1989) and Crabtree and Miller (1999) argue that a prior specification of constructs from literature help the researcher to categorise the data into appropriate sections and shape the emerging theory¹. Sayer (1992, p. 59) defined a theory as a “ . . . *map, recipe or instruction manual, which provides means by which we can do things in the world or cope with events*”. The importance of developing a theory is that a theory helps to trigger world expectations and to explain a witnessed phenomenon in a logical or comprehensible manner (Llewellyn, 2003). Following the suggestion by Eisenhardt, (1989) and Crabtree and Miller (1999), it was decided that the benefits of ERP systems would be categorised according to the constructs

¹ This study will develop a theory based on business case considerations for SMEs adopting ERP systems. The emergent theory will be compared with the literature.

recorded by Shang and Seddon (2000). These constructs stipulate that ERP systems can be acquired for technological, operational, strategic, managerial and organisational reasons. The literature abounds with potential benefits of implementing ERP systems. These are reviewed in this section and summarised in Table 3.

Table 3: Potential ERP Benefits

Benefit	Reference	Benefit	Reference
Operational Benefits		Strategic Benefits	
Leads to cost reduction	Williams and Schubert, 2010; Love et al, 2005; Laukkanen et al, 2007; Shang and Seddon, 2000	Promotes business growth	Esteves, 2009; Love et al, 2005; Shang and Seddon, 2000
Increase productivity	Zach, 2010; Esteves, 2009; Shang and Seddon, 2000	Improvement in information quality	Zach, 2010; Love et al, 2005
Improves customer service	Esteves, 2009; Love et al, 2005; Williams and Schubert, 2010; Shang and Seddon, 2000	Promotes business alliance	Esteves, 2009; Shang and Seddon, 2000
Leads to cycle time reduction (Improved work flow)	Williams and Schubert, 2010; Shang and Seddon, 2000	Allows development of external linkages (with customers, suppliers and clients)	Esteves, 2009; Love et al, 2005; Shang and Seddon, 2000
Eliminates data redundancy	Love et al, 2005; Williams and Schubert, 2010	Promotes business innovations,	Shang and Seddon, 2000
Enhances information flow within the company	Williams and Schubert, 2010	IT Infrastructure Benefits	
Increases data visibility within an organization	Love et al, 2005; Williams and Schubert, 2010	Leads to IT cost reduction	Esteves, 2009; Shang and Seddon, 2000
Allows central information management	Esteves, 2009; Love et al, 2005; Zach, 2010; Williams and Schubert, 2010	Leads to improved IT infrastructure capacity	Esteves, 2009; Zach, 2010; Love et al, 2005; Shang and Seddon, 2000
*Allows flexible system coordination	Love et al, 2005	Develops business flexibility for existing and upcoming changes	Esteves, 2009; Love et al, 2005; Shang and Seddon, 2000
Promotes e-commerce	Zach, 2010	Replacement of aging IT infrastructure or technology,	Esteves, 2009
Speeds up the availability of timely information (reporting)	Zach, 2010; Williams and Schubert, 2010;	Increases standardisation in technologies used	Esteves, 2009
Increases the amount of information and reliability	Zach, 2010	Organisational Benefits	
*Leads to competitive advantage	Love et al, 2005	Promotes organizational changes	Esteves, 2009; Shang and Seddon, 2000
Managerial Benefits		Enhances business learning	Esteves, 2009; Shang and Seddon, 2000
Supports easy decision making and planning process	Esteves, 2009; Love et al, 2005; Garg et al 2006; Williams and Schubert, 2010; Shang and Seddon, 2000	Enhances empowerment	Esteves, 2009; Shang and Seddon, 2000
Leads to better management of resources	Zach, 2010; Shang and Seddon, 2000	Allows the building of common visions	Esteves, 2009; Shang and Seddon, 2000
Performance improvement	Zach, 2010; Williams and Schubert, 2010; Shang and Seddon, 2000		

The benefits marked with an asterisk in the table indicate that previous researchers do not share the same view on the benefit offered by ERP systems to SMEs.

2.4.1 Operational Benefits

ERP systems promise to bring an end to fragmented systems and to integrate operations (Esteves, 2009; Love et al., 2005; Williams and Schubert, 2010; Ondrej, 2010). They can potentially provide data visibility across the whole organisation, allow automation of business processes, standardisation of business processes, do away with idle work, improve information retrieval (reporting), and improve process monitoring (Love et al., 2005; Ondrej, 2010; Williams and Schubert, 2010). In addition, ERP systems can improve the cost effectiveness of an organisation (Laukkanen et al., 2007; Love et al., 2005; Shang and Seddon, 2000; Williams and Schubert, 2010). The use of ERP systems potentially allows for better performance management; refined internal procedures; and increased production efficiency (Federici, 2009). Likewise, the implementation of ERP systems can improve the capacity of organisations to innovate. ERP systems can also enable adherence to common processes (Xia, 2010). Among other advantages, they enhance information flow within the company; eliminate data redundancy (Love et al., 2005; Williams and Schubert, 2010); increase the amount of information and its reliability (Seethamraju and Seethamraju, 2008); allow flexible system coordination; promote e-commerce; speed up the availability of timely information; and allow for enhanced knowledge and skills among primary users (Shang and Seddon, 2000). The adoption of an ERP system leads to better management of resources, competitive advantages and supports globalization (Shang and Seddon, 2000; Singla, 2008).

On the contrary, other researchers offer a different view on the benefits offered by ERP systems to SMEs, arguing that an in-house developed ERP system best suits SMEs. For example, Olsen and Saetre (2007) argue that a commodity ERP system may impose a rigid structure on SMEs. This may weaken competitive advantage as SMEs will not be able to react promptly to customers and suppliers' demands. Seethamraju and Seethamraju (2008) argue that ERP systems are tightly integrated and the more a system is tightly integrated, the more difficult it is to disconnect its parts in order to cater for future needs and growth. For SMEs to be able to react to new demands, they would have to be able to change their ERP systems, which could

be uneconomical and difficult for them (Seethamraju and Seethamraju; 2008). The benefits about which researchers share differing views have been marked with an asterisk in Table 3.

2.4.2 Managerial Benefits

The potential managerial benefits of adopting an ERP system are mainly in the support for decision making and planning processes; leading to better management of resources; and improved performance (Ondrej, 2010; Williams and Schubert, 2010; Seethamraju and Seethamraju, 2008; Shang and Seddon, 2000).

2.4.3 Strategic Benefits

The adoption of an ERP system can potentially promote business growth and alliances; allow for the development of external linkages (with customers, suppliers and clients); promote business innovations through product differentiation (Esteves, 2009; Love et al., 2005; Shang and Seddon, 2000) and lead to improved information quality (Ondrej, 2010; Love et al., 2005).

2.4.4 IT Infrastructure Benefits

If the implementation of an ERP system is done successfully, it can lead to IT cost reduction; improved IT infrastructure, business flexibility around existing and future changes; allows for the replacement of ageing IT infrastructure; improved IT infrastructure capacity; and increased standardisation among technologies used (Esteves, 2009; Ondrej, 2010; Love et al., 2005; Shang and Seddon, 2000; Singla, 2008).

2.4.5 Organisational Benefits

The implementation of ERP systems can potentially promote organisational change; enhances business learning; empowers employees and allows the building of a common vision within an organisation (Esteves, 2009; Shang and Seddon, 2000; Singla, 2000).

2.5 Potential ERP Cost Elements

This section reviews the cost elements associated with the adoption of ERP systems. Considering that ERPs are expensive (Yang et al., 2010) and SMEs suffer from financial constraints, the operational and financial risks tend to become more apparent than the advantages. The identified potential cost elements are listed in

Table 4: Potential ERP Cost Elements

Cost Item	Reference
Hardware	Love et al; 2005; Davenport, 2000; Mckie, 1998
Servers	Elragal and Haddara, 2010; Haddara, 2011
Clients	Elragal and Haddara, 2010; Haddara, 2011
Storage	Elragal and Haddara, 2010; Haddara, 2011
Networking	Love et al; 2005
Software	Love et al; 2005; Davenport, 2000; Mckie, 1998
Database Management System (DBMS)	Elragal and Haddara, 2010; Haddara, 2011
Operating System (OS)	Elragal and Haddara, 2010; Haddara, 2011
ERP License	Elragal and Haddara, 2010; Haddara, 2011
Annual maintenance of the ERP system	Elragal and Haddara, 2010; Haddara, 2011; Love et al; 2005
Upgrading	Elragal and Haddara, 2010; Haddara, 2011
HR Costs	Love et al; 2005
Hiring (IT and Business)	Elragal and Haddara, 2010; Haddara, 2011
Training (IT and Business)	Elragal and Haddara, 2010; Haddara, 2011; Davenport, 2000; Mckie, 1998
Project Management	Elragal and Haddara, 2010; Love et al; 2005
Business Management	Elragal and Haddara, 2010;
External Consulting	Elragal and Haddara, 2010; Love et al; 2005; Davenport, 2000; Mckie, 1998
Change Management (Planning and executing)	Elragal and Haddara, 2010; Love et al; 2005
Customization	Elragal and Haddara, 2010; Haddara, 2011
Cost of migrating data and integrating modules.	Elragal and Haddara, 2010; Haddara, 2011; Love et al; 2005; Davenport, 2000; Mckie, 1998
Vendor Project Management	Elragal and Haddara, 2010; Haddara, 2011
Services	
Hosting	Haddara, 2011
Virtual Private Network (VPN)	Elragal and Haddara, 2010
Business process re-engineering (Planning and executing)	Elragal and Haddara, 2010; Haddara, 2011; Love et al; 2005

2.5.1 Hardware costs

Direct costs are those that are directly associated with the implementation of a system (Love et al., 2004). Direct costs for implementing an ERP system identified in the literature include: IT infrastructure, hardware costs and software costs (Haddara, 2011). Hardware costs can further be broken down into the cost of servers, clients, storage (Elragal and Haddara, 2010; Haddara, 2011), and networking (Love et al.; 2005).

2.5.2 Software costs

Software costs consist of Operating Systems (OS), ERP license and Database Management Systems (DBMS) (Elragal and Haddara, 2010; Haddara, 2011). The other direct cost element identified in the literature is that of implementation. These include the initial cost of the system, customisation costs; costs of migrating data from the old system to the new ERP system; costs of integrating the different modules; annual maintenance costs; update costs, and vendor project management (Elragal and Haddara, 2010; Haddara, 2011; Love et al., 2005; Davenport, 2000; Mckie, 1998).

2.5.3 Human Resources (HR) costs

Indirect costs are those which come about during the implementation process (Irani et al., 2002) and comprise the following: costs of training, reorganisation costs, consultation fees (Davenport, 2000), on-going support and hidden implementation costs (Yang et al., 2010). Indirect costs also encompass Human Resources (HR) costs (Love et al., 2005), and Business Process Re-engineering (BPR) costs. HR costs can further be divided into costs of hiring (IT and business expertise); training (IT and business) (Elragal and Haddara, 2010; Haddara, 2011; Davenport, 2000; Mckie, 1998), project management (planning and executing) and business management (Elragal and Haddara, 2010).

2.3.4 Services

When a company adopts an ERP system, it incurs costs for services. These include services such as Virtual Private Network (VPN), Internet hosting as well as planning and execution of the BPR process (Haddara, 2011). When an ERP system is adopted, the initial implementation disrupts the normal operation of the business

(Buonanno et al., 2005; Ojala et al, 2006), which may lead to productivity losses. Occasionally, companies implement an ERP system and only use a subset of the whole package, limiting the benefits that can be achieved (Ojala et al, 2006). Two other common problems mentioned in the literature are insufficient resources within organisations and projects falling behind schedule (Buonanno et al., 2005; Haddara, 2011). The process of estimating both direct and indirect costs for an ERP adoption is challenging for SMEs (Haddara, 2011).

2.6 Potential ERP Risks

When building a business case, there is a need to consider both the best and worst case scenarios. In most instances, a business case is built taking into account the best case only and does not consider the possibility of risks occurring. However, businesses do operate that way; the worst scenario can happen and so both cases need to be considered (Melendez, 2008). In this section, the potential risks of adopting an ERP system are identified. Willcocks and Margetts (1994) defined a risk as a vulnerability to elements which prevents a project from achieving some or all of the expected benefits. This vulnerability may be due to incompatibilities between the chosen software and hardware; implementation costs which go beyond the budget; and technical systems which perform below standard. Wiegers (1998) defined a risk as an occurrence which threatens the success of a project and may cause a loss. Sumner (2000) classifies risks into several categories. These are: organisational fit, management structure and strategy, skill mix, user involvement and training, software systems design and technology planning integration and they are summarised in Table 5.

2.6.1 Organisational Fit

Organisational risks may originate from the environment in which the system is being implemented (Poba-Nzaou et al., 2008). Olsen (2007) argues that the adoption of a standard ERP system may impose a rigid arrangement on a company and threaten the flexible nature of many SMEs, which need to react fast to transformations in their environment. It is crucial for SMEs to be able to adapt quickly to the requirements of customers and suppliers. In addition, ERP systems may fail to meet the future needs of the organisation (Ojala et al., 2006). An ERP system, unfortunately, rarely fits well

with the business processes of an SME, requiring either that SMEs change their business processes to fit the new system or that they change the ERP system to suit the organisation (Poba- Nzaou et al., 2008). There is also a risk of acquiring off-the-shelf software with overlapping modules which tend to do similar tasks (Iskanius, 2009; Poba- Nzaou et al., 2008).

Table 5: Potential Risks of Implementing an ERP System

Risk	References	Risk	References
User involvement and training		Skill mix	
Insufficient training of end-user	Sumner, 2000; Huang et al, 2004	Insufficient training and re-skilling	Sumner, 2000; Wright and Wright, 2001
Ineffective communications	Sumner, 2000; Huang et al, 2004	Failure to merge internal and external expertise effectively	Sumner, 2000; Huang et al, 2004
Lack of full-time commitment of customers to project management and project activities	Sumner, 2000	Lack of business analysts with business and technology knowledge	Sumner, 2000; Huang et al, 2004; Grabski, et al, 2001
Fail to get user support	Huang et al, 2004; Ojala et al, 2006	Lack of in-house skills/ Insufficient internal expertise	Grabski, et al, 2001
Lack of sensitivity to user resistance	Sumner, 2000; Ojala et al, 2006	Inadequate skills in signing contracts	Ojala et al, 2006
Failure to emphasize reporting	Sumner, 2000	Lack of change management skills and managership	Abini et al, 2007; Grabski, et al, 2001; Al-Mudimigh, et al, 2001
Lack of personnel commitment	Ojala et al, 2006	Unable to recruit and retain qualified ERP experts	Sumner, 2000; Huang et al, 2004; Wright and Wright, 2001
Lack of discipline on working with the system (data entry)	Ojala et al, 2006	Management structure and strategy	
People not realising the benefits of the new system	Ojala et al, 2006	Lack of senior management support	Sumner, 2000; Huang et al, 2004; Ojala et al, 2006
Loss of skills (staff turnover)	Grabski, et al, 2001	Lack of proper management control structure/ Loss of project control	Grabski, et al, 2001; Poba-Nzaou et al, 2008; Sumner, 2000
User resistance	Grabski, et al, 2001	Lack of agreement on project goals	Huang et al, 2004
Organizational fit		Lack of effective project management methodology	Huang et al, 2004
Unable to redesign business processes	Sumner, 2000; Huang et al, 2004	Ineffective Communication	Sumner, 2000
Misalignment of business processes	Poba-Nzaou et al, 2008; Davenport, 1998; 2000	Choosing poor project manager or project group	Ojala et al, 2006
Failure to follow an enterprise-wide design, which supports data integration	Sumner, 2000	Lack of commitment	Ojala et al, 2006
Special needs of a company not defined	Ojala et al, 2006	Software systems design	
Failure to support cross-organization design	Huang et al, 2004	Failure to adhere to standardized specifications which the software supports	Wright and Wright, 2001; Sumner, 2000
Extent of change	Huang et al, 2004	Poor data migration (conversion)	Ojala et al, 2006
System does not support company business	Ojala et al, 2006	Unclear/Misunderstand changing requirements	Huang et al, 2004
Selecting wrong ERP supplier	Ojala et al, 2006	Only part of the system used and benefits not realized	Ojala et al, 2006
The new ERP system may bring a rigid environment to an organization	Olsen, 2007	Technology planning/integration	
Insufficient resources	Huang et al, 2004	Inability to avoid technological bottlenecks	Sumner, 2000
System not meeting future needs of the company	Ojala et al, 2006	Attempting to build bridges to legacy applications	Huang et al, 2004; Sumner, 2000; Wright and Wright, 2001
System not flexible enough under processes' exceptional circumstances	Ojala et al, 2006	Capability of current enterprise technical infrastructure	Huang et al, 2004
Supplier is not committed enough to system implementation	Ojala et al, 2006	Stability of current technology	Huang et al, 2004

Related to business process risks are the risks of failure to redesign business processes (Huang et al., 2004; Sumner, 2000); misalignment of business processes (Davenport, 1998; 2000); and failure to support cross organisation design (Huang et

al., 2004). All needed information may not be entered in the system (Ojala et al., 2006) resulting in problems such as a lack of data integration (Sumner, 2000). The risk of poor organisational fit is associated with cumbersome input functionality; inappropriate formats for data input; inappropriate entity relationships in the data models (Soh, 2000); and undisciplined use of ERP systems at data entry point (Ojala et al., 2006) and these can result in a lack of integration. Alternatively, lack of integration may be due to failure of the ERP system to follow an enterprise-wide design which supports data integration (Sumner, 2000). Due to changes in the business environment, SMEs are interested in ERP system solutions. However, in practise sourcing these ERP systems is a complex issue fraught with problems. There is the risk of choosing an inappropriate ERP system or supplier (Ojala et al., 2006). In some instances, the ERP system choice may be sound in terms of current business needs but there is a risk that the system may fail to support future business needs (Ojala et al., 2006). Other organisational risks described in the literature include lack of commitment from vendors; ERP systems failing to meet business requirements, and insufficient resources to roll out ERP systems (Ojala et al., 2006).

2.6.2 Management Structure and Strategy

With ERP projects, management's loss of control during ERP adoption can impact negatively on the performance of the organisation. The lack of control over project teams may occur as a result of a decentralised decision making processes, which may be followed by ineffective endorsement of decisions (Grabski, et al., 2001). It is common practice to form a project team and assign decision rights to specific individuals with particular knowledge and skills. However, a lack of proper monitoring of this increased responsibility by project managers and the project team may impose a potential business risk (Grabski, et al., 2001; Poba-Nzaou et al., 2008). Lack of competence in negotiating a contract to acquire an ERP system (Ojala et al., 2006) and misunderstandings between the buyer and the supplier (Iskanius, 2009) are some of the problems faced by organisations acquiring ERP systems. Other management related risks include a lack of support and commitment at the executive level (Aloini et al., 2007; Huang et al., 2004; Ojala et al., 2006; Sumner, 2000), the lack of a champion or poor leadership; ineffective communication during the ERP

implementation (Ojala et al., 2006; Sumner, 2000) and the lack of an effective project management methodology (Huang et al., 2004).

2.6.3 User Involvement and Training

Approximately half of ERP projects do not achieve the desired benefits because managers underestimate the efforts involved in change management (Al- Mudimigh, et al, 2001; Aloini et al., 2007). The changes which come with an ERP system can bring about resistance among staff (Grabski et al., 2001). Other risks related to user management are ineffective communication; insufficient training; users unable to realise the benefits of the new ERP system; a lack of personnel commitment; a lack of sensitivity to user resistance; failure to emphasise reporting to users (Huang et al., 2004; Ojala et al., 2006; Sumner, 2000) and loss of user skills (staff turnover) (Grabski et al., 2001).

2.6.4 Skill Mix

The implementation of an ERP system requires special skills during and after implementation. A project team with expertise including change management, business process reengineering (BPR), risk management and technical skills is often required (Grabski et al., 2001). Yet insufficient training and re-skilling; a lack of internal expertise; a lack of business analysts with technology knowledge; the inability to recruit and retain qualified ERP experts; and the failure to mix internal and external expertise effectively may hinder the implementation (Grabski et al., 2001; Huang et al., 2004; Iskanius, 2009; Sumner, 2000 ; Wright and Wright, 2001).

2.6.5 Software Systems Design

Risks in this category include: failure to adhere to standard specifications which the software supports; lack of integration; data security risks created by the system; lack of user controls in the ERP system (Ojala et al., 2006; Sumner, 2000); poor data migration (Ojala et al., 2006; Sumner, 2000); partial system adoption (Ojala et al., 2006); and unclear or misunderstood requirements (Huang et al., 2004).

2.7 Research gaps

The subject of ERP benefits has been extensively discussed in the literature (Shang and Seddon, 2002; Staehr, Shanks, and Seddon, 2002; Staehr, 2007). However,

Schubert and Williams, (2009) argue that the existing research comprises a list of benefits with more focus on how they are measured. The author argues further saying that the existing research is more prescriptive. As a result, despite having extensive research on ERP benefits, organisations still struggle to realise expected benefits (McDonald, 2008; Grant, Wailes, and Wright, 2006). Regarding the benefits which companies do realise, the literature does not explicitly point out whether such benefits were initially listed in the business case or whether they are unintended consequences of the ERP project. In addition, Schubert and Williams (2009) argue that, in general, there is limited research on ERP benefits realisation and the management process of such benefits.

The literature is also limited in that it fails to provide a holistic and detailed analysis of how the benefits realised by companies which adopt ERP systems influence each other. Limited attention has been given to the identification of causal benefits and resultant benefits of an ERP implementation.

Very few studies have looked into ERP cost elements for SMEs adopting ERP systems. Those that are available focused on generic software development cost estimation or looked at ERP cost identification from the perspective portfolio management (Haddara 2012). As a result, there is a gap to be filled on cost element identification which SMEs could use when estimating ERP project costs and or when estimating projected budgets.

There is limited research that focuses on the pre-implementation phase of ERP projects in SMEs (Hustad and Olsen, 2011). The pre-implementation phase involves the process of developing a business case for ERP adoption. Al-Twairish and Al-Mudimigh, (2011) argue that the subject of building a realistic ERP business case is challenging and poorly researched. The author states that the available research is generic and the concept of the business case is fragmented in various topics, such as risk assessments and project evaluation. As a result, studies that focus on business case considerations for SMEs adopting ERP systems could not be found.

Although significant studies have been done on ERP risks, they did not fully investigate the process of risk realisation. Thus the literature is silent on causal and resultant risks. There is no analysis of how the risks realised by companies influence each other. The majority of available studies provide a list of risks and how they can be mitigated without considering how certain risks manifest in others.

2.8 Research Models considered for the study

2.8.1 The Information Technology (IT) Interaction Model

The Information Technology (IT) Interaction Model was proposed by Silver et al. (1995) as a teaching model. The model states that the effects of an Information System (IS) come out over time as a result of the interaction of the system and the organisation. The model has 5 components namely:

1. System effects;
2. The Organizational Context: The Environment and Elements of the Organization;
3. The features of the Information System;
4. The Fit between System Features and Organizational Context; and
5. The implementation process.

Figure 1 shows The IT Interaction Model and its components. It also shows how the components interact with each other.

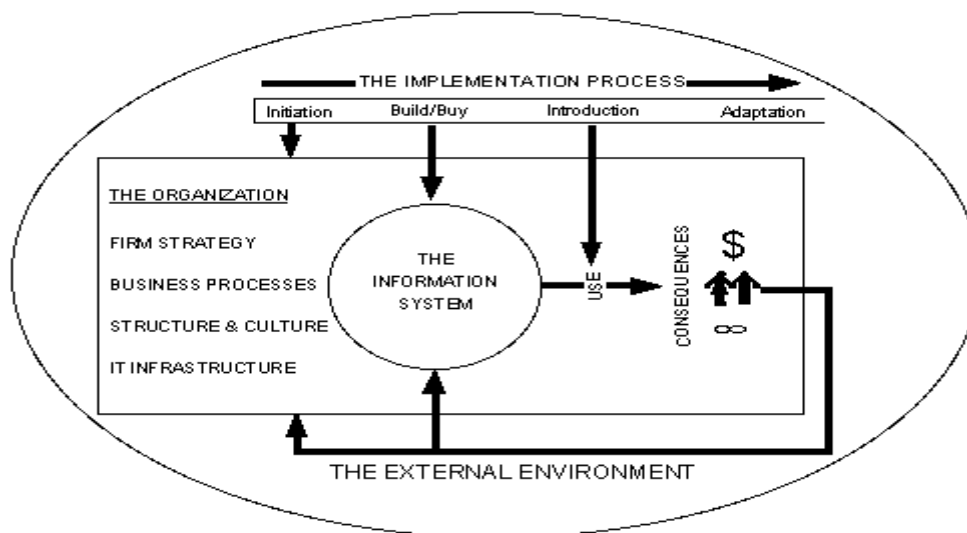


Figure 1: IT Interaction model (Silver et al., 1995)

Discussion of The IT Interaction Model Model dimensions

The following is a summary of the components of the model as explained by Silver et al. (1995).

1. The system's Effects

The consequences of adopting an IS can be in three stages. The first stage is when an IS adopted by an organisation and not used. This step has been described as system non-use. The second stage involves evaluating the effects of a system to an organisation. The third phase covers the adaptation of an organisation to the system over time.

When an IS is introduced in an organisation it may be used as intended, may be used for other purposes it was not designed for or may not be used at all. In the event of non-use of an IS, it results in failure to achieve intended design objective of the IS (Markus and Keil, 1994). Understanding how a system is used is important in evaluating system effects.

The second stage assesses the consequences of adopting an IS to an organisation. The model focuses on performance effects, consequences for people (organisational personnel) and future flexibility. The performance effects, shown by a "\$" in Figure 1, include impact on profit, gross revenue and market share. Consequences for people include shifts in power, job enrichment and deskilling. Future flexibility refers to the ways the information system may enable or limit future strategic initiatives of the organisation. Consequences of an information system (IS) are not uniform. It may bring both desirable and undesirable effects. The third effect of implementing a system is that as the system is used, adjustments will be made over time depending on its perceived consequences for performance, people and future flexibility.

2. Organisational Context: The environment and the Elements of the organisation.

The effects of an IS come from its interaction with the organisational context, which includes its external environment and internal environment. The firm's external environment is defined by factors, such as the relative power of suppliers and buyers, the competitive structure of the industry that is whether the industry is growing, shrinking or stable and the state of technological deployment (McFarlan, 1984; Porter, 1980). The firm's position in relation to its external environment determines which system the organisation chooses to implement (Orlikowski and Robey, 1991).

The internal environment includes factors such as firm's strategy, business processes, IT infrastructure, organisational structure and culture. Examining firm strategy prior to choice of an information system is important. In most cases many of the IS projects are tied to the firm's corporate strategy, culture and organisational structure.

3. Features of The Information System

Features of The Information System includes attributes of an IS that influence system use and system output. These features include attributes such as system functionality and system interface (Silver, 1991).

4. Fit Between Information System Features and the Organisational Context.

At the core of understanding the interaction of an IS and the organisational context is the aspect of "fit". Presumably, an IS must fit into an organisation's business strategy, processes and the environment in general. Business process reengineering was designed to address the problem of misfit and the need for change (Davenport, 1993).

5. The Implementation Process

The implementation process has four stages: (1) initiation, (2) acquisition (build/buy), (3) introduction, and (4) adaptation. In Figure 1, the process is open-ended to indicate that the process of IS adaptation is an on-going thing. In this model the term implementation shall mean all the management policies and interventions associated with the development, introduction and use of an information system from its initiation

to retreat. In Figure 1, time proceeds from left to right. The downward arrows show that the implementation process has an effect to the organisation specifically on the design of an IS.

Application of The IT Interaction Model

The IT Interaction Model can be applied proactively or reactively. It can be used proactively at design stage to analyse matters involved in the designing and implementation of an IS. This will allow corrective action to be taken. Also, The IT Interaction model can be used reactively to analyse what happened to an IS project. This will allow room for improvement.

Previous IS research that applied The IT Interaction Model

Empirical studies that have applied The IT Interaction Model are scarce in literature. The model was used as a teaching model to lay a foundation for the IS course content for MBA students and not as a research model (Silver et al., 1995). Generally, the literature is silent about the model having been used as a research model. The following section discusses another model which was also considered in this study, The Design Reality Gap Model.

2.8.2 The Design Reality Gap Model

The Design Reality Gap Model proposed by Hawari and Heeks (2010) is made up of seven dimensions summarised by the acronym ITPOSMO. The dimensions are as follows:

- Information (data stores, data flows etc);
- Technology (hardware and software);
- Processes (the activities of users and others);
- Objectives and values (through which factors such as culture and politics are manifest);
- Staffing and skills (quantitative and qualitative aspects of competences);
- Management systems and structures; and
- Other resources (particularly time and money).

The dimensions are summarised in Figure 2

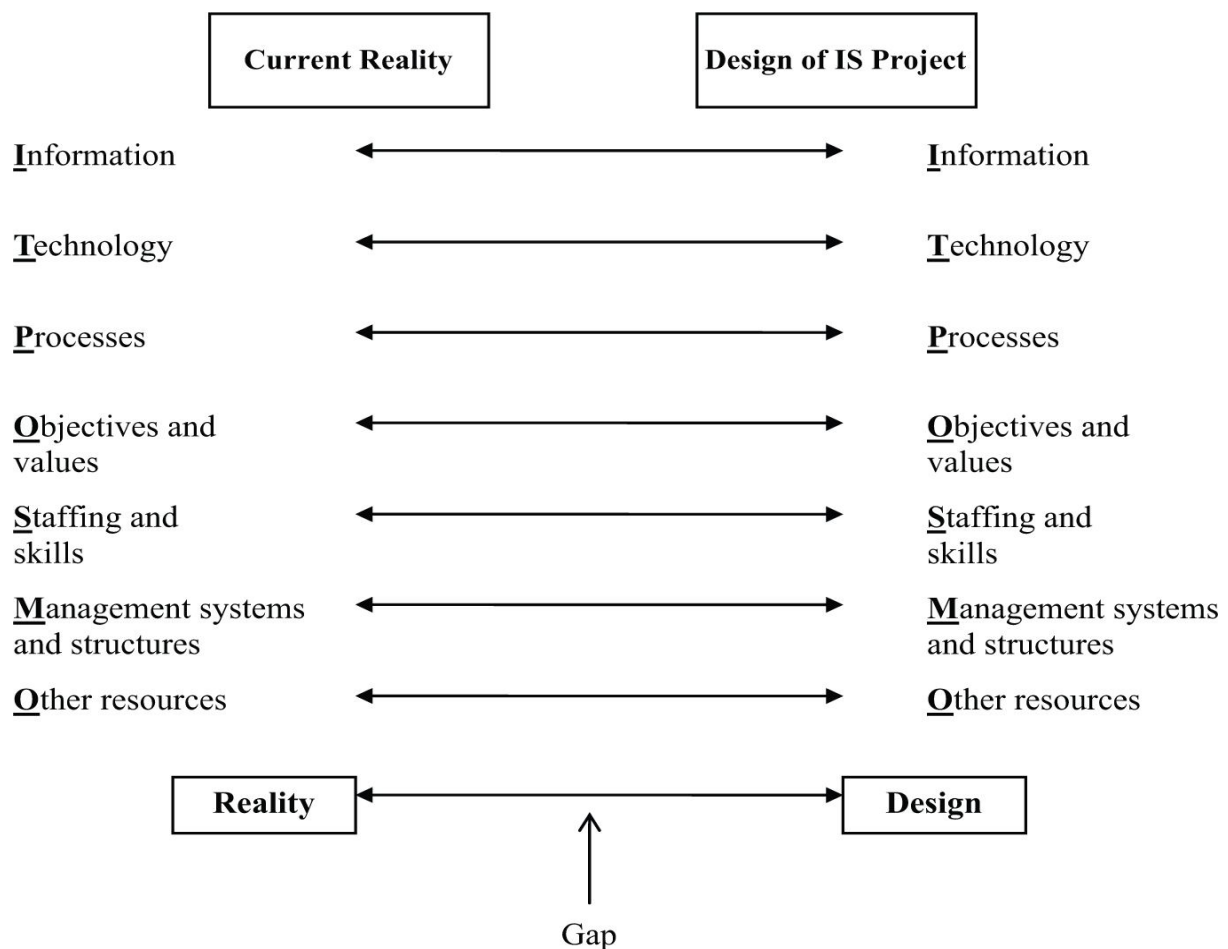


Figure 2: The Design—Reality Gap Model (Hawari and Heeks, 2010)

Discussion of The Design Reality Gap Model dimensions

This section discusses the dimensions of the model in relation to ERP systems and how the concepts from the framework are used in this study.

Information

In this study, information quality refers to the nature of information produced after implementing an ERP system (Lin, 2010). It is measured according to information accuracy; information currency; information completeness and the format in which the information is presented (Nelson et al., 2005). Lin, (2010) concluded that if information supplied by an ERP system is well-formatted, complete, accurate and up to date; it can speed up the rate of task performance and increase employee productivity.

Technology

Organisations implement ERP systems for several reasons. One of the reasons is to replace legacy IT systems (Chand et al., 2005). Although many companies have succeeded in eliminating legacy systems, Markus et al. (2000) argue that the implementation of an ERP system as a technology innovation is a complex process.

Processes

ERP systems were designed to manage and integrate business processes from different functional units into a whole (Lin, 2010). However, the process of integrating and standardising these business processes within an ERP system is usually challenging (Botta-Genoulaz and Millet, 2006).

Objectives and values

There are various organisational factors that affect the process of ERP implementation and its benefits (Lin, 2010). These include, among other organisational factors, the culture of the organisation; business process re-engineering and the capacity to implement an ERP system (Yi and Davis, 2001; Zahra & George, 2002). It is argued that these factors can moderate the outcome of an ERP implementation. Lin (2010) argues that ERP usage is greatly affected by user perceptions. This is, however, influenced by information and system quality.

Staffing and skills

In most cases, SMEs do not have the required in-house skills to carry out a proper installation (Hustad and Olsen, 2011). SMEs also do not possess enough HR and IT competences when compared to LEs (Fisher et al., 2004). In this context, competency refers to the “*knowledge or skill*” to do the job (Mirabile, 1997, p. 75). Dixon and Jones (2011) predicted that to create competitive advantage, organisations would be emphasising process-related skills and competencies.

Management systems and structures

There is a strong relationship between top management support and ERP adoption (Liang et al., 2007). Previous studies have pointed out that there is a need for top management support and participation during an ERP implementation (Chatterjee et al., 2002; Somers and Nelson, 2003). In some instances poor return on IT investment is as a result of the lack of top management involvement (Pijpers et al., 2001).

Other resources

The successful implementation of an ERP system requires top management to provide adequate resources (Law and Ngai, 2007; Somers & Nelson, 2003). In this context, the word resources refer to time and money.

Previous IS research that applied The Design Reality Gap Model

The Model has been applied in various studies in the literature. For example, Hawari and Heeks (2010) used the model to explain ERP failures in developing countries and Heeks (2003) used the model to assess design reality gaps and to address Electronic Government (eGovernment) failures. The model has also been applied in the evaluation of eGovernment initiatives in developing countries by Syamsuddin (2011). Masinde (2006) used The Design Reality Gap Model to explain major causes of IS projects' failures in developing countries. Lessa et al. (2012) used The Design Reality Gap Model as a mid-implementation assessment tool to understand why the project had partly failed. In this study, the Model was used to assess design reality gaps in ERP projects in SMEs.

2.8.3 Justification for choice of model: The Design Reality Gap Model as a lens to analyse realised benefits, risks and costs

Using a model as “lens” in a study means that the researcher uses the model's viewpoint to ascertain accuracy in the study (Creswell and Miller, 2000). This study uses The Design Reality Gap Model as a theoretical base – or “lens”. The Model measures the degree of fit between requirements and assumptions built into the information system design, and the organisational reality found in the context of implementation (Hawari and Heeks, 2010).

Given the gaps in the current literature (discussed in section 2.7), the research objective was to *explore how SMEs develop their business cases, how SMEs justify their investments, as well as how the benefits, risks and costs of ERP systems are realised in SMEs*. In particular, the researcher sought to compare SMEs initial business case considerations (design) to actual outcome (reality) after implementation. Thus the framework which was suitable for comparing design to reality is the Design Reality Gap Model proposed by Hawari and Heeks (2010). The model was used to assess which ERP benefits, risks and costs were initially

predicted prior to an ERP implementation (during the business case development stage), which ones were realised, and how and why these outcomes occurred. The Model was used as a lens to analyse what transpired before and after the implementation of an ERP system in an SME. The scenario blended well with the principles of the framework which was used as a lens to understand the data. However, The IT Interaction Model guided the interview questions. Having stated this, it is important to point out that in this study the model was not used to assess whether an ERP implementation in an SME was a success or a failure.

2.9 Chapter 2 Summary

The literature has highlighted the significance of SMEs in developing countries and the current status of the ERP market among SMEs. Previous studies provided a synopsis of the ERP business case practice and business case considerations. The considerations comprised potential ERP benefits (summarised in Table 3); potential ERP cost elements (summarised in Table 4), and potential ERP risks (summarised in Table 5).

A review of previous studies showed gaps available in the literature. These were discussed accordingly in section 2.7. The chapter concluded by discussing the research models considered. The Design Reality Gap Model) was used in this study. The discussion looked into how the model was used as a lens for both data collection and data analysis. Chapter 3 presents the research methodology in more detail.

Chapter 3: Research Methodology

This chapter describes the research method used. Research design gives an overall direction for the collection and analysis of data in an investigation (Churchill, 1979).

Thus, the objective of this chapter is to describe and explain:

- Research method;
- Research purpose;
- Research philosophy;
- Research strategy;
- Approach to theory;
- Target population and study sample;
- Research timeframe; and
- Methods of data collection and ethical considerations.

The section which follows outlines the research method and provides an argument for using this methodology in this study.

3.1 Research Method: Qualitative Research

This section explains the qualitative research method and puts forward arguments for its use in this study. Qualitative research methods were developed in social sciences to allow the researcher to investigate social and cultural phenomena (Myers, 2009). The goal of this investigation is to understand the business case considerations from the point of view of SMEs (participants) adopting an ERP system. As argued by Myers and Newman (2007), qualitative research methods are designed to assist researchers to understand the views of people and the social and cultural contexts within which they exist. Due to the nature of this investigation, it was decided to use qualitative research methods. Corbin and Strauss (1990) mentioned that one rationale for carrying out qualitative research is the nature of the problem. They further argued that qualitative research methods help to expose and comprehend what lies behind a phenomenon about which little is known. From what has been gathered through the literature review, little is known about SMEs' business case

considerations when adopting ERP systems. Qualitative data will provide in-depth knowledge and understanding of the perceptions involved in business case considerations for SMEs adopting ERP systems in developing countries.

3.2 Research Purpose: Exploratory and Descriptive

The purpose of the study was to explore and describe the business case considerations for SMEs adopting ERP systems. The existing business case considerations were not known to the researcher. The researcher wanted to gain a better understanding of the topic by exploring the data and characteristics of business case considerations.

3.3 Research Philosophy: Interpretive Research

The nature of the phenomenon under investigation and the research questions determine whether the researcher should adopt a positivist, critical or interpretive stance (Orlikowski and Baroudi, 1991). The research philosophy chosen for this investigation was interpretive. According to Myers and Avison (2002, p. 64), *“The aim of all interpretive research is to understand how members of a social group, through their participation in social processes, enact their particular realities and endow them with meaning, and to show how these meanings, beliefs and intentions of the members help to constitute their social action”*.

Applying this approach to this study allowed the researcher to better understand the business cases considerations of SMEs adopting ERP systems. The philosophy reaped deep insights into the phenomena under study and helped to explain, and explore, SME business case considerations and the complexities surrounding adoption of ERP systems. To support the chosen research philosophy, the researcher implemented a case study research strategy.

3.4 Research Strategy: Case Study Approach

According to Eisenhardt (1989, p.532), *“A case study is a research strategy which focuses on understanding the dynamics present within a single setting”*. It’s an

empirical investigation that investigates a phenomenon within its real-life context (Yin, 2009).

An investigation can be done on a single case study or multiple case studies. This research used a multiple case study strategy. The use of multiple cases is seen in the same light as replicating a study or an experiment (Eisenhardt, 1989). However, this approach strengthens the findings (Yin, 1994). Also, a multi-case study approach provides a base for stronger and more robust theory development since the findings are from various empirical sources (Eisenhardt and Graebner, 2007; Yin, 1994). This is important for checking theoretical replication (Bengtsson, 1999).

The multiple case study approach tied in well with the study's research questions. The approach was appropriate for answering 'how' and 'why' research questions. Also, the multiple-case study approach was suitable for exploring the relatively new phenomenon of business case considerations.

The researcher also wanted to investigate both success and failure cases. No detailed cross case analysis was done; however, where contradicting views emerged from the cases investigated, they were discussed accordingly. Thus the following section explains the approach followed to generate the general theory.

3.5 Approach to theory: Inductive

This study was an inductive piece of research. Inductive research develops theory from the observation of empirical study (Welman et al., 2005). In this study, a theory is defined as "an ordered set of assertions about a generic behaviour or structure assumed to hold throughout a significantly broad range of specific instances" (Sutherland, 1975, p.9). In inductive research, the researcher starts by observing a single case or cases and then proceeds to develop a general theory.

The use of Literature in Building the theory

Generating a theory or building a conceptual frame work is a significant part of qualitative research (Llewelyn, 2003). Although this study adopted an inductive reasoning approach to come up with business case considerations for SMEs

adopting ERP systems, it used constructs from literature to explain the considerations. Eisenhardt (1989, p. 536), argued that, “*A priori specification of constructs can also help to shape the initial design of theory building in research. Although this type of specification is not common in theory-building studies to date, it is valuable because it permit researchers to measure constructs more accurately*”.

Initially, several potential benefits, costs and risks for adopting ERP systems were identified in the literature. Based on Eisenhardt’s 1989 argument, these formed the basis for the business case considerations for SMEs adopting ERP systems. Thus some of the themes and categories are used as they were found in literature.

The theory development in this study followed Llewelyn (2003)’s level four of theorisation. Level four explains “*specific social, organisational or individual phenomena in their settings*” (Llewelyn, 2003, p. 674). The next section describes the target population for the study.

3.6 Target population and study sample

The researcher targeted SMEs in sub Saharan Africa, specifically from South Africa and Zimbabwe. These SMEs had implemented an ERP system a minimum of 2 years prior to participation in the study. Two years was perceived to be an appropriate time period for them to have realised some benefits and or risks.

As a result of the limited number of cases which could be investigated in a case study research, it was advisable to select cases where the area of interest was “transparently observable” (Pettigrew, 1988). Accordingly, the aim was to select cases which increase the scope of the current theory or reproduce the emergent theory (Eisenhardt, 1989). Also, it was important to have a sample of individuals who were familiar with phenomena under investigation (Morse, 2007). These could be either professionals in the area under investigation or those who had participated in the phenomena being investigated. As a result of these reasons, a sample for this study was selected purposively. The following sample variations were also considered:

3.6.1 Geographical location

In order to create diversity within the sample, companies were located in 3 different cities dispersed across the region. The companies investigated were located in Cape Town, Johannesburg and Harare. It is important to note that the objective of the study was not to do a comparative analysis of the results across the 3 cities, but through those 3 hubs of cities, an assortment of views regarding the business case considerations for SMEs adopting ERP systems were allowed to emerge. The sampling was done more for diversity than for quantitative representation.

As stated earlier, the purpose of the study was to explore business case considerations for SMEs adopting ERP systems hence the need to have a sample with enough coverage. The findings of this study were to be generalised from experimental findings to general theory and not from a sample to a population. Therefore, statistical-based sampling, as a measure of the quality of the case studies was inappropriate in this case as proposed by Lee and Baskerville (2003).

3.6.2 ERP Products

A similar argument could be made as to why the researcher selected organisations with different ERP products. The aim was not to compare the different ERP products but to introduce variety in the research.

3.6.3 Industry Sectors

The target sample was companies in the distribution and or manufacturing industry sector. This was relevant for contextualising the argument. The findings of the study were designed to explain specific organisational or individual phenomena in their settings as suggested by Llewelyn (2003). The business case considerations were to be explained and generalised in the context of SMEs in the distribution and manufacturing industry sector. The selection of cases in these 2 specific industry sectors allowed the researcher to eliminate environmental disparities associated with a larger range of industry sectors.

3.6.4 Previous Technology

Knowing the previous technology that had been in place before the SME adopted an ERP system was necessary in order to establish whether the benefits, costs and risks which the organisations claimed to have realised could be attributed to the implementation of an ERP system specifically, or whether they were the result of implementing a computerised system per se.

3.6.5 Organisational Sizes

The researcher found it relevant to know the sizes of organisations to ascertain any relationships between organisational size and particular benefits, risks and costs. In general, the target population and study sample accurately represented the research subject. The sample variations which emerged from the study are summarised in Table 8, section 4.1. The next section outlines the time frame for the study.

3.7 Time Frame: Cross-sectional

The available time and resources blended well with a cross-sectional study. The data was collected at a specific point in time, over a short period before it was analysed and reported. The researcher can generalise the findings point in time that the results were collected. This resulted in an in-depth snapshot of an on-going situation. The next section presents the timeline for the study.

3.8 Ethical considerations

3.8.1 Ethical approval

A research proposal, signed ethics form and the research instrument were submitted to the University Ethics Committee for approval. The Ethics Committee assessed the submitted papers and the research was approved.

3.8.2 Confidentiality and Consent

The researcher contacted a number of SMEs seeking permission to carry out an academic study with them. An email with an invitation letter (Appendix A) was sent to all potential participants. In some instances, follow up was done by telephone. Those who were interested in participating in the study responded. However, some

companies claimed to be SMEs turned out not to fit the criteria, according to the South African and Zimbabwean Acts. This problem was realised in the early stages so the researcher began to ask for company profile details, which were used for preliminary screening. The researcher used the data to screen SMEs accepting only those that fit the definition of an SME and had used an ERP system for at least 2 years. Courtesy calls were made to thank all the SMEs that had indicated their interest in participating but were not SMEs according to the research criteria. The researcher contacted the remaining participants by email to set an appointment for the research interviews.

A participation consent form (Appendix B) was emailed to all the participants in advance to give them ample time to read it and prepare any questions they might have had. The participation consent form outlined the aim of the study and all confidentiality and consent matters.

It stated that the individuals would not be identified by their names and or specific positions in written work. Likewise, the names of companies participating in the research would not be published, instead codes such as C1, C2 and C3 were to be used for companies and participants would be known as Respondent 1, Respondent 2 etc. Pseudonyms would be used for ERP products.

In addition, the participation consent form clearly outlined that participation was voluntary and no person would be forced to divulge information unwillingly. Participants were allowed to withdraw from the study whenever they wished to do so. Thus the research was conducted with due consent of the participants. It was made clear that the thesis would not be confidential, but that names of individuals and organisations would remain anonymous.

One participant was selected from each company. However, there were some instances where the first participant suggested that a second opinion can be sought from another participant. As a result, 2 participants were engaged from one of the companies. The participants were either senior managers or those who were actively involved in the ERP project. Two copies of the participation consent form were

signed, by the participant and the researcher. The participants kept one copy while the researcher took the other copy. According to Cohen and Crabtree (2008), ethics should be considered when doing research. Thus the necessary precautions were taken to ensure that ethical considerations were addressed. The next section describes how the data was collected through interviews with the participants.

3.9 Data Collection

3.9.1 The interviews

Interviews are done in most interpretive and qualitative studies and they are a means of getting the views of participants in the field (Myers and Newman, 2007; Walsham, 2006). They give the researcher an opportunity to modify the line of enquiry and to follow up on interesting responses (Robson, 1993). As a result, the data collection for this study took place by means of semi-structured interviews.

Ground work for the interviews

Appropriate interview venues, dates and times were negotiated in advance for all the interviews. Green and Thorogood (2004) argue that interviewees feel relaxed and empowered when they operate from their familiar environments. Thus all the interviews were conducted at the SME site. The majority were done in quiet rooms proposed by the interviewees themselves and a few were conducted in the interviewees' offices. The next section describes the research instrument used in the study.

Research Instrument

The research instrument used in the study was a questionnaire with semi-structured questions. The questionnaire was structured to allow for flexibility and new questions to be brought in during the interview sessions. Appendix C shows a copy of the questionnaire used to conduct the investigation.

The questionnaire was divided into 5 main sections. The first section focused on case and interviewee profiles. The second part asked questions about the ERP system at the organisation. The third section looked at how the ERP fitted into the

business context. The fourth section covered most of the questions and dealt with ERP business case considerations. In general, it focused on ERP benefits, risks and costs including those that had been realised, not realised, or experienced as unexpected. The fourth section also asked questions about how ERP benefits and risks had influenced each other. The organisation's business case development practice was also investigated. The last section focused on concluding questions. The interview questions were emailed to the interviewees in advance to allow them to prepare answers. The next section outlines the content and structure of the interviews.

Content and structure of the interviews

As previously mentioned, the research was conducted by way of in-depth semi-structured interviews. Both structured and unstructured questions were used. This allowed the researcher to use both closed- and open-ended questions (Appendix C). Thus interviewees were given an opportunity to explain situations in their own words. However, some participants required further prompting and this was done by the researcher whenever it was necessary. This practice was in line with Walsham's (2002) recommendation that the use of semi structured interviews allows key questions to be asked and at the same time gives the interviewer an opportunity to pursue interesting subjects with the respondents. Sometimes it was necessary for the researcher to keep the conversation within the scope of the study.

The researcher explained and clarified all ambiguous questions and terms to the interviewees. However, most questions were designed to be clear and straightforward, as recommended by Kvale (2007). The researcher constantly observed cues and gestures from the interviewees and took notes to complement what the interviewees were saying.

After each interview, especially the first interviews, the researcher revisited some of the questions that had been difficult to answer and re-phrased them. This gave the researcher the opportunity correct any mistakes; re-phrase difficult questions and improve the clarity of the questions before the next interview session, as each interview was a pilot session on its own. This helped to ensure appropriate

responses and coherence with the research questions and objectives. Anfara et al (2002, p. 31) stated that, “*researchers should form interview questions on the basis of what truly needs to be known*”. In addition, Yin (1994) argues that the interview questions are supposed to be linked to the data being gathered, research questions and the conclusions to be drawn.

The researcher recognised the time constraints of the interviewees so, in an effort to retain interviewee interest, the interviews were scheduled for 1-hour duration. The length was deemed necessary to allow effective collection of quality data. The researcher sought permission from the participants to record the interviews. Permission was granted and all the interviews were recorded using a dictation machine (Dictaphone). The next section presents the findings of the study and the analysis of the findings.

3.9.2 Document review

Myers (2009) argues that a document review can give an overall view of a situation. In this study, the document review intended reviewing Business Case documents developed by SMEs. Table 8 in Chapter 4 summarises what the SMEs had to provide for review. The reasons why a full document review could not be done are given in detail in Chapter 4 section 4.7. The section discusses the business case development practice in SMEs.

3.10 Data Analysis

Anfara et al (2002, p. 31) state that, “*The purpose of analysis is to bring meaning, structure, and order to data.*” To achieve this, the researcher did not use only a single method to analyse the data. Instead, a mixed method was used. A combination of the following methods was used: the general inductive approach to data analysis (Thomas, 2003); thematic analysis (Braun and Clarke, 2006; Fereday and Muir-Cochrane, 2006); elements of grounded theory (Jones and Alony, 2011; Strauss and Cobin, 1998) and lastly a deductive approach that uses an ‘a priori’ template described by Crabtree and Miller (1999). The use of ‘a priori’ template is a deductive, thematic approach to analysis, which allows the use of categories and themes

defined prior to data analysis, and, at the same time, allows additional themes and categories to emerge inductively from the data (Fereday and Muir-Cochrane, 2006). In this case, the ‘a priori’ template took the form of those ERP categories for benefits, risks and costs, as defined in the literature.

As stated earlier, and important to reassert here, the research strategy for this study was a multi-case approach not grounded theory. However, the researcher did use certain elements of the “grounded theory method”, such as open coding; axial coding and selective coding to conduct data analysis.

Phases of data analysis

The process of data analysis is subjective (Raibee 2004). However, it should be organised and logical. The following steps were used to process and analyse the data.

1. Reading and transcribing the interviews

This involved listening to and transcribing each interview session, as recommended by Braun and Clarke (2006). Each interview was listened to several times as it was being typed in Microsoft Word. The interviews were played back using Microsoft Windows Media Player. Appendix D shows a sample of a transcribed interview. However, the whole transcript could not be made available as that would have compromised anonymity and ethics. Likewise, some text has been removed from the sample. The researcher used his discretion to punctuate the transcription.

Interviews were transcribed soon after each interview session to ensure that the dialogue was still fresh in the interviewer’s mind and to prevent information loss. Also, the interviews were transcribed by the researcher personally to allow for a better understanding of the cases which were being studied.

This stage helped the researcher to become more familiar with the data through re-reading the raw data and checking for preliminary codes. Where necessary, the researcher listened and transcribed the interviews a second time.

2. Open Coding

The objective of doing open coding is to come up with concepts which are later grouped into categories (Strauss and Cobin, 1998). Thus the open coding process focused on identifying, naming, categorising and describing the phenomena found in the text. The transcripts or raw data (Appendix D) and observation notes were carefully examined to identify and to assign labels to emerging categories and themes. This was in accordance with Strauss and Corbin (1990). While the researcher was reading the transcripts, he highlighted key phrases that addressed the research questions (Appendix D). The relevant texts were copied and pasted to a separate Microsoft Excel spreadsheet (Appendix E). Each raw phrase in the spreadsheet had a theme name, category name, links and text extracts from the transcripts.

The researcher used templates of benefits and risks categories from literature. The categorisation of benefits was taken from Shang and Seddon (2000) while the categorisation of risks was according to Summer (2000). The use of templates from the literature was important for the study because it helped the researcher to organise the data into similar or related segments for easy interpretation (Crabtree and Miller, 1999). Themes and categories emerge as a result of constant comparison and memoing (Jones and Alony, 2011). The process of constant comparison involves coding and analysing the data simultaneously (Egan, 2002; Partington, 2000). Thus the coding process was continuous and involved three main activities, including naming, comparing, and making notes. As the coding process continued, the labels of categories and themes were refined (Appendix E). Continuous refinement of the themes produced 17 themes for benefits and 21 themes for risks.

3. Axial coding

The process of axial coding involved linking codes to each other (Appendix E). The codes were linked through establishing causal relationships which were evident in the phrases. The links showed how the realisation of a benefit influences the realisation of other benefits and how the realisation of a risk influences the realisation

of other risks. In some instances, more than one relationship was evident between themes. In fact, Strauss and Corbin (1998) argue that it is possible to have more than one relationship between themes. The relationships and links which emerged from axial coding were used to build the resultant theory. This process of linking codes was achieved through an inductive approach.

During axial coding, the themes and categories which emerged were sorted, theorised, and triangulated with the relevant literature as suggested by (Jones and Alony, 2011). Contrasting the findings with the literature is encouraged as it goes hand in hand with requirements of the constant comparative analysis approach. This practice is encouraged by Strauss and Corbin (1998).

4. Selective coding

The process of selective coding involves “refining the theory” and selecting core categories (Strauss and Corbin, 1998). Where necessary, the categories were modified and combined into core categories and all other categories pointed to the main categories as suggested by Strauss and Corbin (1998). The main idea was to build a single storyline. The researcher only stopped when there was little more to learn from the collected data.

The phases of the data analysis are summarised in Table 6.

Table 6: Phases of Data Analysis used in the study

Phase	Description of the process
1. Reading and transcribing the interviews	<ul style="list-style-type: none">• Listening to and transcribing each interview session.• Reading through the interview transcripts.• Checking for preliminary codes.
2. Open coding	<ul style="list-style-type: none">• Assigning labels to emerging categories and themes.• Highlighting phrases that addressed the research questions.
3. Axial coding	<ul style="list-style-type: none">• Establishing links between the codes

4. Selective coding	<ul style="list-style-type: none">• Selecting core categories and refining the theory
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It is important to note that the process of data analyses was not sequential but an iterative process as suggested by Fereday and Muir-Cochrane (2006). The next section discusses how compliance with the requirements for research validity and reliability was ensured.

3.11 Research validity and reliability

Qualitative research has a common criticism that it does not adhere to standards of reliability and validity (LeCompte and Goetz, 1982). A study carried out by Boudreaue et al (2001) revealed that, in general, IS researchers need to improve their validation strategies to achieve the required rigor in the validation of research instruments. Thus this section focuses on the validity and reliability checks that were used in this study.

3.11.1 Research Reliability

Reliability involves examining the findings to establish how stable or consistent the responses are (Denzin, 1989). The researcher followed some of the reliability procedures proposed by Anfara et al. (2002); Creswell (2009) and Olson and Spiers, (2002). The following verification procedures were completed:

- The transcripts were read and checked for mistakes several times.
- The researcher ensured that there were no deviations in definitions and applications of codes during the coding process.
- The findings were reviewed and cross-checked by the research supervisor (peer reviewed). This was important to maintain consistency in interpretation of the findings.
- The findings of this investigation were contrasted with the literature to establish similarities and contradictions. As a result, the findings were strongly triangulated results on which to base a theory of evolving business case considerations.

- The researcher consistently checked the research objectives, research questions, research design and data collection strategies to ensure coherence during the research process.

Despite completing these procedures, Eisenhardt, 1989 p. 536 argue that “*no construct is guaranteed a place in the resultant theory, no matter how well it is measured*”.

3.11.2 Research validity

Research validity can either be internal or external. Internal validity is based on establishing how accurate the findings are (Creswell 2009). It considers credibility of data analysis; trustworthiness and authenticity of the findings. Ensuring internal validity encompasses checking data accuracy and bias during data analysis (Whittemore, et al., 2001).

To ensure internal validity, the researcher implemented multiple validity checks as suggested by Creswell (2009); Creswell and Miller (2000); and Whittemore, et al. (2001). The following checks were completed:

- To avoid bias, the researcher was consistently neutral throughout the investigation so as not to influence the research outcome.
- The researcher was self-conscious; persistent in making observations and taking notes during data collection to compliment the recordings.
- The findings were triangulated with the literature, as explained earlier.

External validity is concerned with how well the conclusions can be generalised to a larger population (Myers, 2007). However, the generalisation of interpretive case studies remains a major challenge in the field of Information Systems (Lee and Baskerville, 2003; Walsham, 1995). Specifically, the challenge lies in the extent to which the results obtained in an interpretive case study can be generalised to a different setting (Byrne and Sahay, 2007). However, Walsham (1995) argues that findings obtained from an empirical interpretive study can explain a certain

phenomenon in a specific setting but the findings can be applied to other organisations in other contexts in future.

In a qualitative study, the objective is not to replicate findings but to generate a comprehensible description of a phenomenon (Schofield, 2000). Myers (2000) argues that replicating a qualitative study is not an easy process because the study may not necessarily have the same participants. Thus the goal of a qualitative study is to produce edifying research results which enhance understanding of a phenomenon according to a specific setting or context (Llewelyn, 2002). Eisenhardt (1989) argues that choosing a suitable population helps to eliminate variation and define the margins for generalising the outcome of the investigation. The researcher took steps to achieve this and asserts that the findings of this study can be generalised to SMEs in the manufacturing and distribution industry sectors. In addition, this study adopts Lee and Baskerville (2003)'s empirical to theoretical generalisation category, which generalises a measurement, observation or description to a theory. Thus the findings of this empirical investigation can be generalised to the emergent theory.

Participants and cases were purposefully selected and screened hence they were appropriate for the phenomenon investigated. Thus, according to Anfara et al. (2002), the findings are transferable.

3.12 Chapter 3 summary

The chapter presented the research methodology used in this study. The nature of the problem which was being investigated tallied well with a qualitative research method. As a result, the research followed an interpretive research philosophy and a case study research strategy. The time which was available was suitable for a cross sectional study. The research purpose adopted in this study was exploratory and descriptive. The next chapter presents and discusses the findings of the study.

Chapter 4: Findings and Analysis

The goal of this chapter is to present the findings from an empirical study conducted in South Africa and Zimbabwe. The chapter is organised as follows: Section 4.1 outlines diversity within the research. Case descriptions are given in section 4.2. Section 4.3 provides an overview of how the results are presented. Section 4.4 discusses ERP benefits which emerged from the study. Section 4.5 discusses ERP risks while section 4.6 explores ERP cost elements which were present in the study. Section 4.7 discusses the power distance and education levels in SMEs. An overview of the current ERP system business case development practice in SMEs is presented in section 4.8. Section 4.9 provides a summary. The chapter concludes by outlining the limitations of the study in section 4.10. The next section outlines the variations in the study. The significance of these variations was discussed in Chapter 3 section 3.6.

4.1 Diversity within the research

In the interests of gathering diverse perspectives, the researcher conducted 10 interviews in 8 companies which were geographically dispersed in Sub-Saharan Africa. The selected companies were of varied technological back grounds; they used different ERP products; were of different organisational sizes; and they belonged to either the distribution and/or manufacturing industry sectors.

Table 7 summarises the case studies and their distribution according to cities; industry sectors; ERP products and previous technologies.

Table 7: Summary of variations in the study

ERP Name	Frequency	Industry sector	Frequency	City	Frequency	Previous technology	Frequency
Alpha	3	Distribution	4	Johannesburg	2	Manual system	1
Beta	2	Manufacturing	0	Harare	2	Bespoke system	5
Omega	3	Manufacturing and distribution	4	Cape Town	4	ERP Re-implementation	4

4.2 The nature of SMEs and Case descriptions

4.2.1 The nature of SMEs investigated: The power distance and education levels in SMEs

Although it was not one of the objectives of this study to investigate the power distance and education levels in SMEs, discussing it was found relevant as it helped to explain why a second participant could not be found and the current ERP SME business case practise in section 4.7. Thus this section explains the power distance between managers/owners and subordinates and the big gap in education levels that existed between managers/owners and subordinates within the SMEs investigated.

The SMEs investigated brought out that there was a big gap in education and skills levels between SMEs managers and subordinates. The managers were educated and skilled people while the subordinates were less educated. As stated by the respondents: *“In terms of our staff, they are not very well educated people”* (Respondent 6, C4).

“the people we have are not very well educated” (Respondent 2, C2).

Also, there were high levels of power distance between senior managers of the SMEs and the subordinates. As stated by the participants:

“There is no other person who knows in detail what is happening here except me” ...
(Respondent 2, C2).

When you implement a new system and there is a problem in the process. You would want someone to be able to make an informed decision on the next step and obviously report back on that problem. But because of limited knowledge (of the subordinates), that sort of decision making is not there” (Respondent 6, C4).

The comment from Respondent 2 show that the subordinates were not empowered enough to be involved in day to day operations so that they know in detail what was going on in the organisations. Also, as indicated by Respondent 6, because of small knowledge base and lack of education skills, the subordinates were unable to make informed decisions. The power gap which existed between managers and subordinates was compounded by the inequalities in the education levels and skills base. As a result of the above mentioned reasons, the administration and management of the SMEs was centralised to the CEOs or the owners of the SMEs.

Due to the inequalities in education levels and the gap that existed between the managers and the subordinates, the researcher could not secure a second interviewee in six of the cases investigated. Since only senior managers knew what was happening in the companies, interviewing a second respondent proved to be useless. The attempted two interviews were shallow as the respondents kept on referring the questions to the senior manager.

Also, none of the SMEs managed to produce a Business case document for review as was initially expected by the researcher. A summary of these details is provided in Table 8, section 4.2.

4.2.2 Case Descriptions

The purpose of this section is to give a description of each case investigated. Table 8 summarises the cases investigated.

Table 8: Summary of cases investigated

Case Study Number	Data sources					Number of employees in the case	Name of ERP used
	Document Review	Interviews					
	Business Case document available for review	Number of interviews conducted	Interview Number	Respondent Number	Position of Respondent		
Case 1 (C1)	No	2	1	1	Chief Financial Officer	25	Alpha
Case 2 (C2)	No	1	2	2	Commercial and Financial Manager	27	Alpha
Case 1 (C1)	No	1	3	3	Accountant	25	Alpha
Case 3 (C3)	No	1	4	4	Finance Manager	150	Omega
Case 3 (C3)	No	1	5	5	Senior Systems Developer	150	Omega
Case 4 (C4)	A short email was available	2	6	6	Operations Manager	80	Omega
Case 5 (C5)	No	1	7	7	Managing Director	94	Alpha
Case 6 (C6)	No	1	8	8	Managing Director	65	Omega
Case 7 (C7)	No	1	9	9	Finance Director	75	Beta
Case 8 (C8)	No	1	10	10	Finance Director	88	Beta

4.2.1 Case 1 (C1)

C1 specialises in importing, warehousing and distributing confectionaries and biscuits to retailers and wholesalers. The company was established as a family business in the 1990s. Since then, the business has been growing gradually. The company has approximately 25 employees and the annual revenue turnover is between 25 and 30 million Rands.

Initially, as a family business, C1 used a bespoke system. As time progressed, the need for a better system became compelling. In an attempt to solve persistent organisational problems, C1 adopted an ERP system, which shall be dubbed “Alpha”. The adopted ERP system was in use for a period of about 1 year before a complete re-implementation was called for. In total, C1 has been using an ERP system for more than 2 and half years, including the first year before the system was re-

implemented. Currently, C1 uses the following ERP modules: Supply Chain Management (SCM), Accounting, and Sales and Distribution. Nine employees use the system on a regular basis.

During the ERP adoption process, no formal business case documentation was completed. The project was justified through a series of meetings and discussions between the ERP vendor and the Chief Financial Officer (CFO). The meetings were attended by the ERP vendor representative and the CFO, and were later followed by a series of workshops. There was no budget set aside specifically for the project. The agreement to adopt system “Alpha” was based on a fixed contract between the ERP vendor and the CFO which stipulated that the implementation would be done for the fixed sum. This was the CFO’s first experience with an ERP system implementation.

4.2.2 Case 2 (C2)

C2 specialises in importing communication equipment from America and distributing it in Africa. The company, founded as a family business, currently employs about 27 people and it generates annual revenue of approximately R40 million.

C2 implemented system “Alpha” 6 years ago, replacing an older version of another ERP system which shall be dubbed “Beta”. There are 15 regular “Alpha” users. “Beta” had failed to meet new organisational requirements hence the need for a replacement. According to the Project Manager, C2 adopted system “Alpha” hoping that it would solve its problems, but to their utmost dismay, it hurled the company into a new set of problems.

To conduct their business, C2 run another system (Sales Force) parallel to “Alpha” and which adds Customer Relationship Management (CRM) and job card modules. However, Sales Force is too expensive for C2 and plans are underway to source a cheaper system in the near future. The new system to replace Sales Force is expected to deliver better CRM and job card modules. The “Alpha” consultants have been made aware of the persistent problems being experienced by C2 regarding their system but they have proved beyond reasonable doubt that they are unable to provide a solution. The management of C2 will not completely replace “Alpha” as

they are happy with certain modules but the new ERP system is fully expected to integrate with “Alpha”.

4.2.3 Case 3 (C3)

C3 was established as a family business in the 1940s. Over the years, it has grown to 5 branches in different provinces around the country. These are located in Bloemfontein, Durban, Johannesburg, Nelspruit and Centurion. The company started by supplying basic consumables to the pathology industry and it has grown to become one of the largest suppliers of laboratory equipment. C3 has a staff complement of about 150 employees and it has a revenue turnover of about 10 million Rands. About 70 percent of the business focuses on importing, warehousing and distributing medical equipment while 30 percent is manufacturing of laboratory equipment. The business was run as a family business until recently when it changed its management model to follow a more formal structure.

C3 used to operate a bespoke system which later turned out to be a problem when the developer was no longer accessible. In addition, the bespoke system was described as a “basic” system, meaning it could not provide all the functionality required by C3. The system was not integrated did not offer the modules required by C3. It was a matter of what system C3 should move to as opposed to whether it could move. The company evaluated 3 systems namely, “Omega”, “Beta” and, briefly, “Alpha”. The team which assessed the ERP systems was made up of senior management who were simultaneously very involved in business operations. All the ERP vendors were asked to give a demonstration of their system before the company opted for system “Omega”.

A new project manager with international exposure was engaged. The previous financial manager had been more interested in financial accounting while side-lining IT. The new project manager had once looked at system “Beta” for the previous employer and also had vast experience in working with different Enterprise Systems (ES). There was no formal business case document developed during the adoption process. The project was justified through meetings with the ERP vendors. The meetings were held between the Project Manager, 2 Senior Managers from C3, an

ERP sales person and the ERP technical person. The system and business case was assessed at that level and C3 made the decision to implement system “Omega”. Thus it was an informal process. Two respondents were interviewed at C3, namely the Project Manager (respondent 4) and the Senior Systems Administrator (respondent 5).

4.2.4 Case 4 (C4)

C4 is a private company in the pharmaceutical industry. The company procures pharmaceutical stock, warehouses it, packs it and dispatches it to customers. It is therefore in the wholesale and distribution industry of pharmaceutical stock. C4 employs about 80 people and generates annual revenue turnover close to half a million Rands.

With the goal of replacing stand-alone legacy systems, C4 started the ERP selection and implementation process. A new Operations Manager was employed and tasked with management of the roll-out process. Apparently, the new Operations Manager had been involved with system implementations for various companies over much of his career. Four systems consisting of 2 ERP systems and 2 customised pharmaceutical systems were evaluated. System “Omega” was chosen as the best system. The major influencing factor was the availability of local support and the system’s ability to interface easily with other, internally developed software. A single interview was done with the Operations Manager who was also the Project Manager.

4.2.5 Case 5 (C5)

Case 5 company is a medium-sized company. C5 specialises in manufacturing, supplying and servicing of mining equipment which includes gear boxes. C5 has a staff complement of 94 employees and an annual revenue turnover of approximately 100 million Rands. The company implemented the ERP system dubbed “Omega”. This system was used for 10 years before C5 migrated to system “Alpha”. “Omega” had been unable to handle some of the transactions as required by C5 management. In addition, the system continuously generated errors and the situation became complex to the extent that C5 could not operate independently from a consultant.

Before adopting “Alpha”, C5 looked at 4 other ERP products. At the time of conducting the interview, C5 had been using “Alpha” for 5 years. However, system “Alpha” has failed to deliver the main functionalities it was adopted for. C5 management had recently engaged other suppliers and they have since done presentations. There is a chance that the company may move to yet another system in the near future. The Project Manager, who was the respondent for this study has been with the company for 7 years.

4.2.6 Case 6 (C6)

C6 is a manufacturer and distributor of footwear and shoe-care products. It imports some of its products from outside countries while at the same time it exports some of its products. The products are distributed through shoe shops, pharmacies, retailers, and health shops. The company has been in business for more than 15 years. The project manager (respondent 8) has been with the company for the past 2 years and was not part of the team which started the ERP implementation. C6 has 65 employees and 20 of them are system users.

4.2.7 Case 7 (C7)

Case 7 is a Medium-Sized Enterprise (ME) engaged in the manufacturing of roofing materials and steel equipment. C7 has approximately 75 employees. Fifteen years ago, the company decided to invest in an ERP system and implemented system “Beta”. The main reason for the investment was not communicated to all managers; rather, it was a directive from senior management. In addition to system “Beta”, C7 still runs a separate cash book system dubbed “TECO”. No formal business case was developed.

4.2.8 Case 8 (C8)

Founded in the 1980s, C8 employees approximately 88 people. C8 distributes air conditioning and refrigeration equipment. It also does the actual installation of electrical equipment, servicing and repairing of refrigerators and air-conditioning equipment. C8 implemented an ERP system 9 years ago after struggling with its bespoke system. The main goal was to have an integrated system. Despite adopting

an ERP system, the company still operates a payroll system parallel to “Beta”. The respondent has been with the company for more than 20 years.

4.3 How the findings are presented

This section presents the findings which emerged from the study. The findings are divided into 3 main sections namely benefits, risks and costs. It is important to note that the benefit, risk and cost themes which emerged from the study were analysed separately and independently.

Benefits were analysed first; followed by risks and costs were analysed last. Each section has different categories in it. Benefits are divided into five categories, namely operational benefits; managerial benefits; strategic benefits; IT infrastructure benefits; and organisational benefits. Similarly, five categories emerged for risks. These are: inadequate organizational fit; inadequate skills; inadequate user involvement and training; inadequate management strategy and skills, and inadequate software systems design. As for costs, three categories emerged. These are: hardware costs; software costs and implementation services costs.

Each category has multiple themes underneath. Each theme is described and then followed by a summary of the results from open coding and interview quotes. The discussion that follows elaborates the findings by briefly describing how the theme was realised. Each theme is then contrasted with the findings in the literature. Eisenhardt (1989) argues that, when building a theory it is important to do a comparison of the emergent theory with literature.

As the themes were analysed in detail, diagrams were drawn to show how each theme influences or is influenced by other themes where applicable. For benefits and risks only, these diagrams were combined into two larger diagrams referred to in this study as interdependency frameworks. The interdependency frameworks show how certain themes are co-dependent on one another. The occurrence of one theme influences or is influenced by the occurrence of other themes. As for costs, it emerged that they do not influence each other the way benefits and risks do hence

there is are interdependence diagrams associated with the cost themes that emerged.

As stated earlier, one of the objectives of this study was to investigate the expected and unexpected benefits and risks realised by SMEs when they adopt ERP systems. However, in some instances, respondents could not explicitly differentiate unexpected benefits and risks from expected ones. Due to this unforeseeable circumstance, the researcher used his discretion to decide whether a benefit, risk or cost was expected or unexpected. For example, when one of the respondents was asked to describe any unexpected benefits, they struggled to do so because there had been no benefit realisation assessment framework. The respondent could not distinguish the unexpected from the expected. As the interview progressed, the respondent passes the following comment:

“The first year we implemented an ERP system, our turnover (company's total revenue) grew by 46 percent (...). We did not expect that!” (Respondent 2, C2)

From this statement, the benefit of growth in revenue and profitability was classified as an unexpected benefit. When the same respondent was asked why they had to adopt “Alpha” (an ERP system), the respondent had this to say:

... “In the old system, sometimes credit notes took about 2 weeks to process, sometimes they even took 2 months before they were processed. Now, with the new system it’s instant, it takes a few seconds (...) so in terms of speeding up the flow of information, the new system has a drastic effect”.... (emphasising) (Respondent 2, C2).

Looking at the 2 comments made by the same respondent, it was apparent that the management of C2 were expecting an ERP system to speed up the flow of information. However, the implications of the fast flow of information (real time business intelligence) to the business was not conspicuous to the management of C2, hence they were not expecting a 46 percent business growth. Thus the benefit of real time business intelligence was classified as an expected benefit while the benefit

that an ERP leads to business growth was classified as unexpected benefit. An explanation of how these two benefits relate to each other follows later. The next section presents an analysis of the ERP benefits which emerged from the study.

4.4 Benefits realised

This section focuses on the benefits which emerged from the investigation. As mentioned in the introduction of this chapter, the benefits are divided into five categories proposed by Shang and Saddon (2000). All the benefits evident in the study are summarised in Table 9.

Table 9: ERP benefit themes (adapted from Shang and Seddon, 2000)

	Benefit Category		Theme	
Benefits	1	Operational Benefits	1.1	Cost reduction
			1.2	Cycle time reduction
			1.3	Scalability
			1.4	Reduction in human errors
			1.5	Sales increase
			1.6	Growth in revenue turnover and profitability
	2	Managerial benefits	2.1	Internal data integration
			2.2	Elimination of data redundancy
			2.2	Real time business intelligence
			2.3	Improved information visibility
			2.5	Improved stock and financial control
	3	Strategic Benefits	3.1	Supply Chain Integration (SCI) and Customer Relationship Management (CRM)
			3.2	Electronic commerce (E-commerce)
			3.3	Adherence to standards of practice
	4	IT Infrastructure benefits	4.1	Development of IT infrastructure
	5	Organisational Benefits	5.1	Empowerment of employees
			5.2	Promotes organisational change

Table 10 provides a summary of benefits evident in each case; the total number of text appearances found in the transcript per case and benefit (conversational density) as well as the total number of text appearances for each realised benefit across all the cases investigated.

Table 10: Summary of benefits evident in each case and the total number of text appearances

Benefits realised		Cases investigated and corresponding text appearances												Total text appearances per realised benefit	
Operational Benefits		C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8						
1.0	Cost reduction	X 2	X 2	X 1	X 3								X 2	11	
1.2	Cycle time reduction	X 2	X 3	X 3	X 1								X 1	10	
1.3	Scalability	X 3	X 1		X 1									5	
1.4	Reduction in human error				X 1	X 1							X 1	3	
1.5	Sales Increase	X 1	X 2	X 5									X 1	9	
1.6	Growth in revenue turnover and profitability	X 1	X 1	X 1											
Managerial benefits															
2.1	Internal data integration	X 2	X 3	X 2	X 2					X 1	X 1			11	
2.2	Elimination of data redundancy				X 1								X 1	2	
2.3	Real time business intelligence	X 1	X 3		X 1	X 1			X 1	X 1				8	
2.4	Information visibility	X 2	X 1	X 1	X 2	X 1	X 1						X 1	9	
2.5	Improved stock and financial control	X 4		X 2				X 2						7	
Strategic Benefits															
3.1	Supply Chain Integration (SCI) and Customer Relationship Management (CRM)	X 10		X 4				X 1						15	
3.2	Electronic commerce	X 2		X 1										3	
3.3	Adherence to standards of practice and data control		X 1	X 7			X 1	X 1						10	
IT Infrastructure benefits															
4.1	Development of IT infrastructure	X 1	X 1	X 2		X 1			X 1					6	
Organisational Benefits															
5.1	Empowerment of employees			X 7	X 1									8	
5.2	Promotes organisational change			X 3				X 1	X 1					5	

Key

X	2	The benefit was evident in the case; it was expected and it had 2 text appearances in the interview transcript (it was mentioned twice during the interview sessions)
X	3	The benefit was evident in the case and it was not expected. It was mentioned 3 times during the interview sessions.
X	1	The benefit was expected to be realized in the case but it was not. It was mentioned once during the interview session.
		The benefit was not evident in the case.

As shown in Table 10, the green dominates. This implies that the majority of benefits realized were expected benefits. Yellow is scattered indicating that few benefits were realized unexpectedly. Red is scarce implying that very few expected benefits were not realized.

4.4.1 Operational Benefits

Operational benefits comprise those which SMEs valued when they were using an ERP system to conduct operational activities. Operational activities include day to day tasks or activities that are usually repeated periodically, such as daily, weekly and monthly (Shang and Saddon, 2002). In this study, the implementation of an ERP system was successful in yielding benefits such as reducing costs; reducing human errors; speeding up the processing of transactions; increasing sales and promoted growth in revenue, turnover and profitability.

4.4.1.1 Cost reduction

Cost reduction is one of the themes which emerged during the coding process. This theme describes how SMEs experienced a decrease in the costs of producing a service or a product after implementing an ERP system. The theme was evident in five cases. However, in two of the cases the benefit was expected but never realised. One company realised it unexpectedly and two cases got what they were expecting. The theme made eleven appearances in all the interviews conducted. The following quotes demonstrate the existence of cost reduction in the cases investigated:

... *"I can tell you, previously, before we implemented an ERP system; in our production floor we had the equivalent of about twenty people doing the same amount of work as we do now with about ten people."* (Respondent 6, C4).

... *"We retrenched them (employees). That is the only place we could save money."* (Respondent 2, C2).

Discussion

In general, participants shared the view that implementing an ERP system results in cost saving. The costs were saved in various ways depending on the company. For example, as reported by Respondent 6, after implementing an ERP system the SME discovered that there was no need to replace employees who were leaving the company because the new ERP system allowed them to handle more operations on the production floor without hiring additional people. Also, there was a high possibility that after adopting an ERP system, employees would become more effective as 10 people could do work which was once done by 20 people.

These findings concur with previous studies which reported that the adoption of an ERP system makes employees more effective; cuts down labour costs and results in administrative expense reduction (Equey and Fragniere, 2008; Esteves, 2009; Federici, 2009;; Ondrej, 2011; Shang and Seddon, 2000; Schubert and Williams, 2009; Williams and Schubert, 2010).

As reported by Respondent 2, some of the SMEs retrenched employees after implementing an ERP system thereby cutting down on labour costs. However, Ondrej (2011) argues that layoffs are more likely to happen in LEs as a result of improved efficiency than in SMEs. The argument is that in SMEs, employees do not have defined roles and duties hence employees may not become more efficient in performing their duties. Thus, the implementation of an ERP system may not reduce HR costs significantly. However, this study found that employees can become efficient even in SMEs. As commented by one respondent: ... *"We have been able to re-skill our staff to get people do things more efficiently"* (Respondent 4, C3).

One of the participants put forward the idea that the saving of costs through reduced staff does not happen as soon as the company implements an ERP system but it's a process which happens over time. The following comment describes this view: ... *"It's not that we let people go when we put in the new system, but as they left, we realised we can still do the same volume of output with less people because of the system we put in."* (Respondent 6, C4). The respondent who made this comment realised this benefit 2 years down the line.

One participant emphasised that the sole purpose of implementing an ERP system should not be to reduce labour costs because a system cannot replace a person but it should rather be a business initiative. As stated by one participant: ... *"Yeah (referring to saving staff costs through implementing an ERP system), but that should never be your reason for changing a system. If that is the reason from the onset, I do not think you will be making the right choice for putting in a new system. Upgrading or putting in a new system should be considered over a period of time, specifically to enhance your business and not to save costs (emphasising) ... a system cannot save as a person, in other words if I have to put it on paper and tell you I am going to save X amount of money then I will be making a mistake"* (Respondent 6, C4). In contrast with this view, reducing labour costs was one of the main reasons some SMEs implemented an ERP system. As indicated by the participant from C8: ... *"Actually one of the justifications why we put in the new ERP system was that we could cut down staff costs, which did not materialise"* (Respondent 10, C8). Unfortunately, in this instance, the objective was not achieved.

Ondrej, (2010) mentioned that the adoption of an ERP system results in paper-saving which is environment friendly. However, this study found that the implementation of an ERP system could not lead to cost reduction through paper saving. The following statement was made by one of the participants: ... *"We also thought we could save more paper, but in actual fact it is still the same amount if not more"* (Respondent 2, C2). It was an expected benefit which C2 looked forward to but it did not materialize. There is a possibility that after the implementation of an ERP system, more paper was being used.

According to Ondrej (2010), due to dynamic environments, it is difficult to relate ERP benefits to business measures such as cost reduction, enhanced capability and productivity improvement. This view corresponds with the findings. Some of the SMEs found it difficult to measure ERP benefits and to relate them to cost reduction. The failure to measure the benefits and costs accurately was attributed to a hyper inflationary environment. One of the respondents mentioned: ...*"Sometimes it was difficult to measure our benefits because of inflationwe could not see whether our costs were going up or down"* (Respondent 10, C8).

Although cost reduction is a frequently reported benefit in the literature, usually it increases with company size and level of bureaucracy and SMEs have less complex processes and smaller administrative offices (Federici, 2009). It is also important to note that reducing costs through reduced labour might not be considered a benefit in countries with high levels of unemployment where SMEs are seen as creators of employment.

4.4.1.2 Cycle time reduction

Cycle time reduction refers to a decrease in the time interval during which a recurring sequence of events take place. The majority of the investigated cases witnessed cycle time reduction and an improvement in transaction throughput. Also, the majority of the SMEs which realised this benefit were expecting it. Only one company realised the benefit unexpectedly. The following quotes reveal how this benefit was achieved:

... *"In the old system, sometimes credit notes took about two weeks to process, sometimes they even took two months before they are processed, now, with the new system it's instant, it takes a few seconds ... so in terms of speeding up the flow of information, the new system has a drastic effect."*... (Respondent 2, C2).

... *"If you are processing an invoice or a quotation and it needs approval... a message pops up on my screen and it will indicate to me that a document needs my approval. If I click on it, I can see the document; I can see the note you wrote stating why you want me to approve it. I can then approve it and the moment I approve it, a*

pop up message appears on your screen to say I have just approved it and then you can process or print the document. The process is now instant, unlike in the past when it used to take days.” (Respondent 10, C8).

Discussion

The interviewees from five cases acknowledged that there was a reduction in cycle time and an improvement in response time; which is the time taken by the system to process user requests. For example, with particular reference to C2, the waiting period for the processing of credit notes reduced from two weeks to almost instantly. Also, after implementing an ERP system, users were able to get feedback from the system quickly due to improved workflow efficiency. Prior to ERP implementation, the authorisation of documents took a long time but with the implementation of the new system, they were done instantly.

The findings are consistent with the literature which states that the adoption of an ERP system results in process efficiency and time gains (Elragal and Al-Serafi, 2011; Equey and Fragniere, 2008; Esteves, 2009; Tsai et al., 2007; Williams and Schubert, 2010; Ondrej 2010 and Schubert and Williams, 2009).

4.4.1.3 Scalability

This theme describes the extent to which an ERP system is successful in handling the growing processing needs of SMEs. The benefit was evident in a minority of the cases investigated. Two of the cases were expecting it while it was realised unexpectedly in one case. The following quotations demonstrate this theme:

... “It does not matter whether we process 100 invoices a day or 10 thousand invoices a day because we don’t do that manually ... from that perspective we have become far more scalable.” (Respondent 1, C1).

... “So in terms of back office processing power ... we can at least double production with more or less the same head count.” (Respondent 2, C2).

Discussion

The SMEs benefited noticeably from the implementation of an ERP system. Larger volumes of transactions and higher levels of production were effectively supported by an ERP system. This was achieved with the same or less manpower. Scalability was the main benefit expected by C1. As reported by the participant for C1: ... *“The main strategy was to make ourselves more scalable.”* (Respondent 1, C1). The expected benefit was indeed achieved.

The finding that implementation of an ERP system results in the processing of a larger volume of transactions has been reported in previous studies such as that done by Umble et al. (2003).

Analysis suggests that scalability results in cost reduction. For example, as expressed by participants from C1 and C4: ... *“We would not need to hire more staff to do the work; it’s not sort of a linear relationship which often it would be if we manually processed the invoices ... It does not matter whether we process 100 invoices a day or 10 thousand invoices a day because we don’t do it manually now.”* (Respondent 1, C1).

... *“We realised we can still do the same volume of output with less people because of the system we put in.”* (Respondent 6, C4). As exemplified by Respondent 1, the volume of output to be processed by the SMEs per day no longer depended on the manpower available. In some instances, as exemplified by Respondent 6, the same volume of output could be produced with fewer people. This confirms that an ERP system has the capacity to process more transactions with fewer people hence reducing the manpower required. Consequently, this results in reduced labour costs. To complement these findings, a study done by Umble et al. (2003) found that after implementing an ERP system the volume of transaction levels in a case investigated grew by 48 percent. Due to this increase, the company (investigated by Umble et al. (2003)) was supposed to add 22 more staff members to cope with the new volume of business but due to system efficiency only 14 people were added.

The findings indicate that scalability results in cycle time reduction. Thus, a greater volume can be processed in a shorter space of time resulting in gains in turnaround times. These relationships are shown in Figure 3.

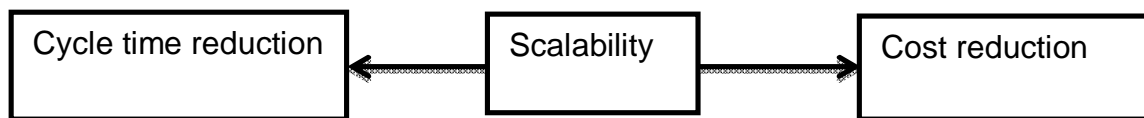


Figure 3: scalability can results in cycle time reduction and cost reduction

4.4.1.4 Reduction in errors

The introduction of an ERP system into SMEs reduced the amount of errors in the system. The benefit was evident in three SMEs and none of them expected this benefit. Also, the theme had low conversational density. The following are samples from the interviews:

... “Everything on our shop floor is now barcode controlled. We are now using scanners to put goods in and out of the system. No manual lists or checks, it’s all electronic. So the system takes care of checking the balances - no more human error.” (Respondent 6, C4).

... “Since we had separate systems, reconciling the data manually was not easy. It was subject to a lot of errors but now the system takes care of most of the calculations...if one person made a mistake during data capturing, we had to go through the whole file to check where the mistake is.” (Respondent 10, C8).

Discussion

Due to the automation of business processes, companies which implemented an ERP system realised a reduction in errors. This simply means these SMEs managed to achieve improved quality of information. The improvement was in information consistency and accuracy. Some of the errors were a result of capturing data manually. For example, an ERP system allowed the use of scanners and did away

with manual check lists and manual capturing of data which had resulted in errors previously.

Review of the literature indicated that the use of an ERP system improves information reliability; reduces the error rate and gives more accurate outcomes (Equey and Fragniere, 2008; 2010; Ondrej, 2010; Ondrej, 2011; Williams and Schubert). However, Elragal and Al-Serafi (2011) found that the implementation of an ERP system reduced the number of errors in doing tasks but with little significant effect on organisations at a higher level.

4.4.1.5 Increase in sales

The implementation of an ERP system brought about an increase in sales. The theme was evident in four cases. Two of the companies were expecting the benefit and it was fully achieved. However, it was an unexpected benefit for the other two cases. The benefit was mentioned nine times in the interview sessions. Samples of the interview quotes are given below:

... “After implementing “Alpha”, we more than doubled our sales; in South Africa we have increased our sales four fold ... We grew in sales ... We were very much understated, nobody knew about us; now we have a very good presence in the market and this is one of the drivers (referring to an ERP as a driver).” (Respondent 4, C3).

... “We have seen tremendous growth in our sales and in many entities which would not have happened if we had not improved the basic system (by implementing an ERP system).” (Respondent 6, C4).

Discussion

The implementation of an ERP system led to growth in sales figures. For example, C3 doubled its sales figures within one year. The tremendous growth of sales was attributed to the new ERP system which had been implemented. This was one of the company’s goals from the onset. As indicated by the respondent: ... “The goal was to drive our sales and market share.” (Respondent 4, C3).

C1 acknowledged that implementing an ERP system had resulted in an increase in sales. However, at the time of the interview the company had not reached its expected target. As reported by the respondent: ... *“On the sales side we are almost there.”* (Respondent 1, C1). This implies that the benefit was not yet fully realised.

This benefit has been reported several times in the literature. Various authors such as (but not limited to) Hamilton and Asundi, 2008; Schubert and Williams, 2009; and Ondrej, 2011, have reported that implementing an ERP system led to an increase in sales. Although in some instances the benefit was realized as early as within a year, Hamilton and Asundi (2008) suggest that such a benefit is normally achieved after a period of 3 to 6 years. On the contrary, Kennerley and Neely (2001) concluded that the rate of sales turnover is not affected positively by implementing an ERP system. In their study sales remained unaffected. Presumably, the delays in increased sales turnover vary from company to company.

4.4.1.6 Growth in revenue turnover and profitability

The theme was evident in a minority of the cases investigated. It was expected in 2 cases and realized in 3. The following quotes illustrates how the benefit was realized:

... *“We grew in profitability; we moved into another sphere in terms of where we are in the market.”* (Respondent 4, C3).

... *“The first year we implemented an ERP system, our turnover grew by 46 percent.”* (Respondent 2, C2).

Other SMEs such as C2 explained their objective of implementing an ERP system saying: ... *“The goal was to ... increase profits.”* (Respondent 4, C3).

Discussion

The implementation of an ERP system brought about a positive change in revenue turnover within SMEs. The revenue turnover for C2 grew by our turnover grew by 46 percent. On the contrary, Wei (2008) argues that the introduction of an ERP system into a company does not necessarily change the financial performance of

organizations. Profits remain at the same level they were prior to an ERP system implementation. However, an ERP system results in enhanced capabilities in the company's information system which facilitates an increase in sales, resulting in greater profitability and revenue turnover (Umble et al. 2003).

Analysis of the findings show that increase in sales result in growth in revenue turnover and profitability. In a study by Umble et al. (2003), the increase in volume of transactions processed within a short space of time resulted in the company achieving a sales revenue increase of 22 percent. These relationships are represented in Figure 4.

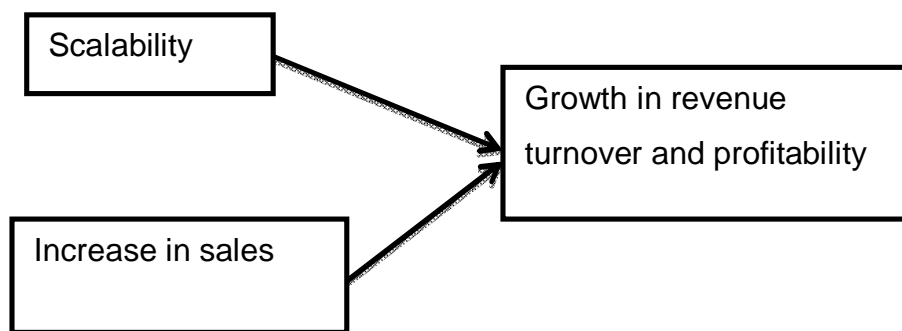


Figure 4: Scalability and sales increase can result in growth in revenue turnover and profitability

4.4.2 Managerial benefits

Managerial benefits incorporate those related to the control and monitoring of organisational resources and support for strategic decision making (Shang and Seddon, 2002). Five related themes emerged in this category namely internal data integration; control of resources; elimination of data redundancy; real time business intelligence and information visibility. The following sections look at the themes in detail.

4.4.2.1 Internal data integration

The theme describes how the introduction of an ERP system allows the aggregation of company data into a common repository. Internal data integration was a dominant benefit and was realised by the majority of SMEs, which were also expecting the benefit. It was evident in six of the cases investigated and the conversational density

consisted of eleven text appearances. Examples from the interview quotes are as follows:

... *“Everything is now in one system.”* (Respondent 1, C1)

... *“The other thing is, everything is on one screen, you know. It sounds simple but we did not have that.”*(Respondent 2, C2).

... *“Besides the benefit of getting a new ERP system, which brought integration”* ... (Respondent 4, C3).

Discussion

The results show that the ERP system facilitated the aggregation of corporate data within organisations. Thus, different departments could access data held centrally. This gave SMEs the ability to combine and standardize their data. Companies which had separate systems running parallel prior to ERP implementation appreciated this benefit the most and could see the significance of having an ERP system as compared to those which had migrated from a manual system to an ERP system. Internal data integration is one of the benefits which SMEs realised relatively soon after implementing an ERP system. As reported by one participant: ... *“We were running 3 bespoke systems, so benefits like this* (referring to internal data integration)*... because we are running an integrated product; we started reaping the benefit immediately.”* (Respondent 6, C4).

ERP systems allow central information management and central access to applications (Esteves 2009; Elragal and Al-Serafi 2011; Love et al., 2005; Seethamraju, 2008; Williams and Schubert, 2010 and Ondrej, 2010; Ondrej, 2011). Generally, SMEs are fairly centralised hence information management is perceived to be centralized even before implementing an ERP system (Seethamraju and Seethamraju 2008). In this view, the implementation may not help much in terms of central management of information. However, evidence from this study did not support such findings. In fact, it was found that the implementation of an ERP system helped to link different processes and modules. The findings show that the benefit is

not unique to large organisations since SMEs also realised the same benefit and appreciated it. However, the benefits of integration depend on the depth of integration achieved during an ERP implementation (Seethamraju and Seethamraju 2008).

4.4.2.2 Elimination of data redundancy

SMEs benefited from the elimination of duplicated data in the system. The theme was evident in 2 cases only. In addition, the conversational density was low. However, the companies which realised the benefit were expecting it. It was mentioned only twice in the interview sessions:

... “Since we were running 3 bespoke systems, we had some repetition. In the inventory module you had to capture the same data you would capture in the financial module.” (Respondent 6, C4).

Discussion

The adoption of an ERP system gave SMEs the opportunity to organise their data while suppressing duplicates in the system. Once there are no duplicates in the system, data is more reliable and accurate. This finding is not exclusive to this study only. It is consistent with previous investigations such as those conducted by Love et al. (2005); Williams and Schubert (2010); and Ondrej (2011).

The quote from Respondent 6 shows that once C4 stopped using three bespoke systems and adopted an ERP system, they managed to get rid of redundancy. Thus implementing an ERP system enhances integration by linking together separate modules and eliminating data redundancy. Figure 5 shows that the elimination of data redundancy is dependent on achieving full integration first.

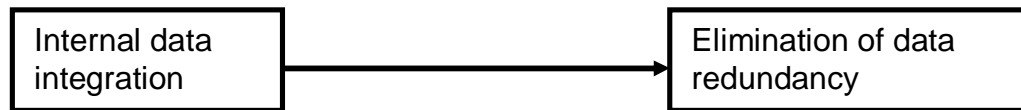


Figure 5: Internal data integration can influence the elimination of data redundancy

4.4.2.3 Real time business intelligence

The introduction of a new ERP system enabled SMEs to get up-to-the-minute data. The benefit was evident in six companies and the total number of text appearances was eight. The majority of companies which realised this benefit were expecting it a small minority realised it unexpectedly. The following quotes illustrate how the benefit was realised:

... *"If someone changes something in Johannesburg, an immediate report should be there and that is what we are getting."* (Respondent 4, C3).

... *"Basically we wanted a live system; we wanted live information, live reporting. ... we craved for live information and we got it."* (Respondent 2, C2).

... *"Any stock transfers or transactions that they do are updated instantly."* (Respondent 1, C1).

Discussion

The ERP systems assisted SMEs to deliver business information without delay. The users got a real-time view of business transactions as they happened. This helped to keep management up to date with current information. The findings coincide with the view that an ERP system facilitates easy information retrieval (Federici, 2009; Williams and Schubert, 2010; Ondrej, 2010 and Ondrej, 2011).

Companies with branches scattered around the country emphasized the importance of this benefit more than those which were not decentralized. In addition to these

findings, companies which were concerned with stock management enjoyed this benefit more.

Analysis suggests that full data integration results in achieving real time business intelligence. In turn, timeous access to information results in significant sales increases. As explained by one participant: ... *“Our turnover (company's total revenue) grew by 46 percent because information was accessible quicker, it was actually instant ... We did not change anything else or the way we operate except that information flow was quicker, that had a massive impact on this company.”* (Respondent 2, C2). Analysis indicated that sales increased due to improvements to processes such as fast processing of purchase orders, stock transfers and on-time deliveries. The relationships which emerged during axial coding are shown in Figure 6.

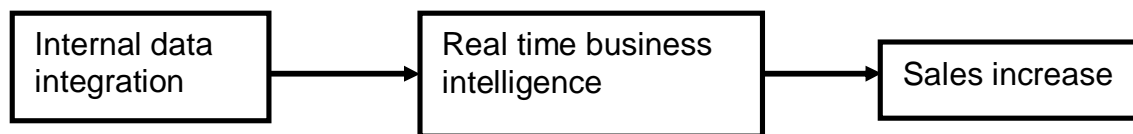


Figure 6: Internal data integration can enable real time business intelligence which in turn can result in sales increase

4.4.2.4 Improved information visibility

Information visibility was one of the dominant themes which emerged from the study. The benefit was mentioned eight times during the interview sessions in six of the cases. All the companies which were looking forward to this benefit got it. The theme describes how readily accessible the information was to end users and how easily the information was understood. The following quotes illustrate how the benefit was achieved:

... *“I must say monthly reporting and analysis became much easier; we managed to get much more information from the system reports.”* (Respondent 7, C5).

... *“The ERP system helps with product sales forecasting, current sales figures, current stock levels and the need for purchasing new stock. It* (referring to an ERP

system) *gives information such as when stock will be arriving. It give us the sales figures, we can see who the top clients are so that we can track those people actually to drive the sales a lot more.*" (Respondent 5, C3)

Discussion

The ERP system was successful in providing a complete overview of business transactions as they occurred. It allowed SMEs to track inventory flow; analyze customer behavior; have a better data overview, and to track and trace orders. These findings are not unique to this investigation. Earlier studies such as those conducted by Love et al. (2005); Williams and Schubert (2010); Ondrej (2010); Ondrej (2011) reported similar findings.

Analysis of the findings has also shown that internal data integration results in better information visibility. In a separate study, Ondrej (2011) pointed out that the integration of data results in improved data transparency in companies. The relationship is illustrated in Figure 7

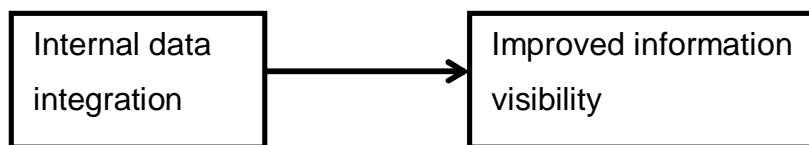


Figure 7: Internal data integration can result in improved information visibility

4.4.2.5 Improved stock and financial control

The introduction of a new ERP system was seen in the improved control of resources such as stock and finance. Although the benefit was not dominant, all of the three cases which expected this benefit managed to realise it. The theme had eight text appearances in the interview transcript. The following are examples of quotes extracted from the interview sessions:

... "From my perspective, the significant benefits are financial control and stock control. We use it mainly as a financial tool rather than anything else ... and we should be able to see exactly what we have in the warehouses ... at all times we are fully aware of the stock we have and you know, from our side, we can therefore plan and manage our stocks and sales." (Respondent 1, C1).

... *"It helps in knowing the stock availability and location it helps a lot in the organisation, in terms of knowing the levels of stock we currently have."* (Respondent 5, C3).

... *"The objective of implementing an ERP system was accountability of funds and this was achieved ... any funds that are spent by anyone rely on Omega. Nothing happens without the key processes being followed and the documentation being in Omega."* (Respondent 8, Case 6).

Discussion

The analysis indicated that the ERP system was successful in facilitating the regulation of stock in SMEs. They were able to check stock levels and decide when to replenish their stocks. It helped to improve inventory accuracy and management and, generally, SMEs had a better inventory overview. Also, the introduction of an ERP system allowed SMEs to place better financial controls in their operations.

The implementation of an ERP system eliminates problems such as missing inventories; erratic pricing of made-to-order products and the duplication of orders (Seethamraju and Seethamraju, 2008; Ondrej, 2011). The authors argue further that if such problems are not eliminated, they lead to loss of customer goodwill. Hence implementing an ERP system improves customer service.

4.4.3 Strategic Benefits

This study has revealed that ERP systems have the capacity to assist companies to come up with a sustainable, IT-based plan to achieve strategic goals. Four themes emerged in this investigation namely: Supply Chain Integration (SCI) and Customer Relationship Management (CRM); promotion of e-commerce; facilitation of flexible business operations and adherence to standards of practice. The following section looks at the above themes in more detail.

4.4.3.1 Supply Chain Integration (SCI) and Customer Relationship Management (CRM)

Although the theme could not be described as dominant, the companies which realised the benefit put forward a strong emphasis on the significance of the benefit. This was evident in the conversational density. There were 15 text appearances in three cases. This was the most talked about benefit in study. The following quotes are extracted from the interview sessions:

... “We have hundreds of automated reports that run at night and send emails with information that customers and suppliers would need. Again, the system for us and our requirements in terms of information sharing to suppliers and customers was exactly what we were looking for.” (Respondent 6, C4).

.. “The systems allows us to monitor the supply chain activities ... we are always fully aware of the stocks the suppliers have; we can view the progress of our purchase orders and the movement of stock orders” (Respondent 4, C3).

Discussion

The ERP systems brought with them information technologies that allowed SMEs to manage the supply chain. As exemplified by Respondent 6 above, following the implementation of an ERP system, SMEs could better manage the collaboration and inter-organization flow of information. This was particularly important to maintain channels of communication with customers and suppliers. Also, it resulted in the seamless flow of stock level information, sales and purchase orders up and down the supply chain.

The findings of this study echoed results from research done by Esteves (2009) and Shang and Seddon (2000). ERP systems facilitate external integration (Schubert and Williams, 2009; Ondrej, 2010; Ondrej, 2011). Thus the benefit has been reported several times in the literature.

Establishing external links through Supply Chain Integration (SCI) and Customer Relationship Management (CRM) was not necessary for all SMEs. It added value to those companies which needed data integration with suppliers and customers only.

Respondent 1 commented as follows: ... *“I would say one of the criteria when deciding on implementing an ERP system is who are you doing business with? In other words, are you doing business with someone who you need to do some data integration with? That was one of the main reasons why we moved to “Alpha” system. If there is a requirement to do data integration with a third party, then it’s quite nice to have this type of a system.”* (Respondent 1, C1).

Analysis indicated that Supply Chain Integration (SCI) and Customer Relationship Management (CRM) lead to better information visibility. Because of the integrated nature of an ERP system, it provided customers and suppliers with a clear, unobstructed view of the data. As reported by the respondent for C4: ... *“It allows you control, it allows you transparency on information ... we are in a market where access to information is very important so all our suppliers and customers want access to their information on our system. With Omega’s flexibility, it allows them a 100 percent visibility to the information.”* (Respondent 6, C4).

This study showed that the introduction of an ERP system in SMEs, particularly those with Supply Chain Integration capabilities offered benefits such as improved stock turnover and reduced inventory holding costs. For example, as expressed by one participant: ... *“In terms of benefits it is exactly where the supply chain management in the world is moving you know. Less stock in the warehouse; we do not have to hold much stock. In other words, centralised procurement from our side lowers inventory holding costs and increases stock turnover. To be able to do that you need something that will allow you to interact easily with any other systems outside there and Omega can do that very easily* (Respondent 6, C4). The introduction of an ERP system led to improved order cycle times and improved stock turnover which resulted in a growth in sales and revenue turnover: The respondent for C4 said: ... *“We have seen growth in sales, stock turnover, revenue and profitability simply because of fast processing of purchase orders and sales orders.”* (Respondent 6, C4). This statement also implies that cycle time reduction results in revenue growth and sales growth. Subsequently, an increase in sales results in revenue growth and profitability. Also, it was noted that improved information visibility in turn allows better control of

resources such as stock. The relationships which emerged during axial coding are shown in Figure 8.

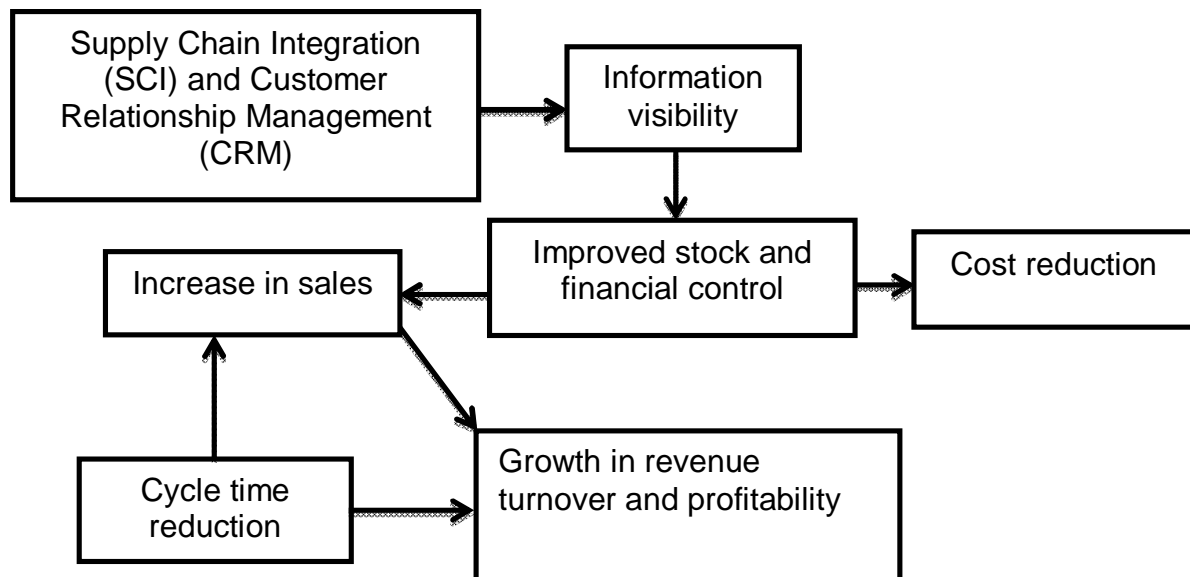


Figure 8: Achieving SCI and CRM can result in achieving information visibility, improved stock and financial control and growth in revenue turnover and profitability. Growth in revenue turnover and profitability can be a result of increased sales and cycle time reduction. Better stock and financial control and cycle time reduction can result in increase in sales. Better stock and financial control can result in cost reduction

4.4.3.2 E-commerce

A minority of SMEs acknowledged that implementing an ERP system allowed them to perform transactions electronically. The benefit had a low conversational density, as evidenced by three text appearances in two cases. The following quote illustrates the benefit:

... *"They just suck down the orders on a computerised system (referring to an ERP system). No paper work is involved; it is done automatically."* (Respondent 1, C1)

Discussion

This study showed that the ERP systems were successful in allowing SMEs to use the Internet as the medium of communication between sales representatives and their customers. As indicated by one participant: ... *“The moment we bought “Beta”, we moved away from sales representatives being desk-bound and we moved them to laptops with Internet and 3G cards pretty much immediately.”* (Respondent 4, C3). This promoted Business-to-Consumer (B2C) procurement of goods and services since SMEs could sell to the general public through online web-based procurement.

Also, the use of ERP systems promoted online procurement of goods. This was particularly important for SMEs within the supply chain. The process of doing business online proved to be efficient and saved time. To some of the companies, doing online transactions was a strategy to reduce costs and increase sales. Also, it became apparent that after implementing an ERP system, transactions within some of the SMEs were no longer constrained by normal business hours and geographic location. This allowed companies to extend their trading hours in a relatively cheap way. *“Now our competitors do not have the tools we have ... we have people in areas like Nelspruit, Polokwane, East London working from home ... so the days of travelling to an area of work or doing business telephonically or actually seeing somebody on the ground are gone.”* (Respondent 4, C3).

The literature review showed that the implementation of an ERP system improves customer service (Schubert and Williams, 2009) and promotes E-commerce (Ondrej, 2011). The introduction of an ERP system allows the execution of inter-organisational transactions such as the electronic exchange of financial transactions between SMEs and LEs in the supply chain. As expressed by one participant: ... *“One of the things we wanted to do was to try and upgrade our computer system (referring to an ERP system), especially the accounting system so that our ledgers integrate with the likes of A and B (A and B are pseudonyms for retailers) ... and that was achieved.”* (Respondent 1, C1). It also facilitated business-to-business interactions such as order generation and stock transfers, as explained earlier.

It was found that e-commerce results in increased sales and profitability. As reported by Respondent 4: ... *“I think the strategy of taking our mobile workforce out there and making our workforce mobile gave us the ability to increase sales, which we did immediately. Now our competitors do not have the tools we have. ...We have seen growth there, competitors are pulling out, some of them are moving to national call centres and we are moving the other way. We have been able to do that because our workforce is mobile and for profitability, it’s a model which is a lot better.”* (Respondent 4, C3)

It was evident that a relationship exists between e-commerce and Supply Chain Integration. SCI promotes e-commerce. Establishing external links through Supply Chain Integration assisted SMEs to automate and streamline their buying and selling processes. Presumably, this reduced their sales and purchasing overheads. In relation to these findings, Bendoly and Schoenherr (2005) argue that, as a result of business to business procurement, companies which use ERP systems earn better savings. Figure 9 shows the relationships which emerged from the study.

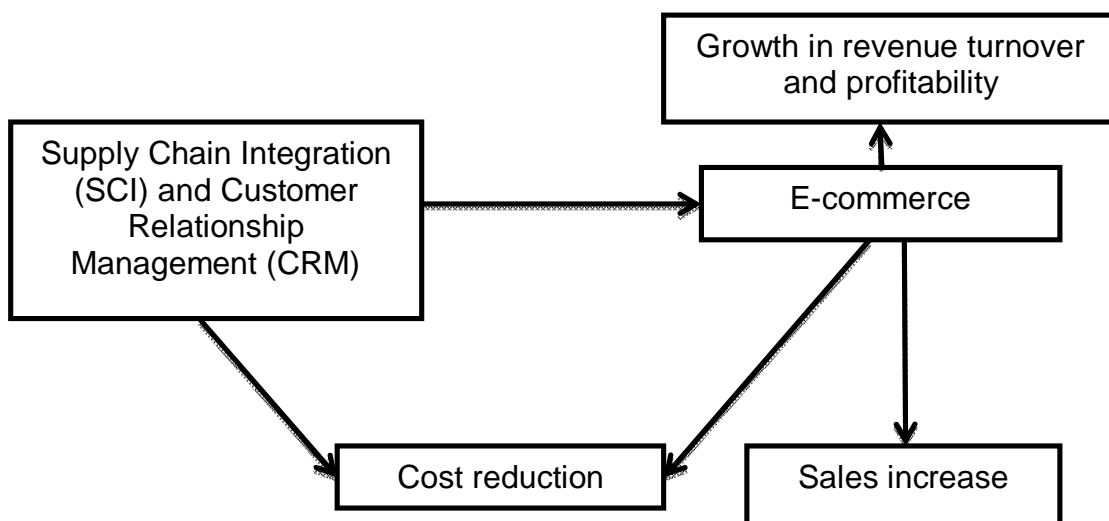


Figure 9: E-commerce can be influenced by SCI and CRM and in turn the realisation of cost reduction; sales increase and growth in revenue turnover and profitability

4.4.3.3 Adherence to standards of practice

Adherence to standards of practice describes how an ERP system helped SMEs to ensure that their practises were within the recommended standards. The theme emerged in 4 of the cases studied and it was mentioned 10 times during the interview sessions. The following are extracts from the interviews where participants explained why their businesses were thriving:

... “In terms of the way an ERP system functions and what it does, I think it helped to build a platform which is based on international standards. The change management advantages (brought by the ERP system) were massive; it gave us that platform to build a business which companies out there may follow. The ERP procedures follow corporate governance standards. We developed over the years to doing things with the exception to the rule to be become the norm”. (Respondent 4, C3).

... “Beta (the adopted ERP) was a good excuse in many ways to change our business and to restructure our business.... we got insight on better business solutions because this system is used by many companies and it’s a standard system.” (Respondent 10, C8)

Discussion

SMEs which adopted ERP systems reported that the system was a good excuse for them to follow recommended standards. They followed the best business practices embedded within the ERP’s design. That process gave them an opportunity to shape their business operations and strategy. They restructured departments and business processes to adhere to standards and best practices which are internationally recognised. In a way, implementing an ERP used by a number of clients in an industry segment was an opportunity for SMEs to correct their past mistakes. As reported by one participant: *“In certain areas we were doing things badly and we are doing them correctly. It (referring to an ERP system) gave us the opportunity to review our business processes. There is a new module in Omega right now which is a process modelling manager; it forces you to map processes before you implement them.”* (Respondent 4, C3). Due to the business efficiencies supported by the ERP system, best business practices became a source of competitive advantage.

ERP systems are popular due to their promise to transform businesses as a result of the best practices embedded within their design (Timbrell et al., 2001). They play a significant role in shaping business operations and strategy (Davenport, 2000). The best practices assist organisations to operate within standard constraints (Cortada, 1998). However, as these best practises become available to all organizations in the software marketplace, they cease to offer a competitive advantage to organisations (Gratton and Ghoshal, 2005; Carr, 2004).

4.4.4 IT Infrastructure benefits

IT Infrastructure comprises IT resources which lay a foundation for present and future business applications. These IT resources can be sharable and re-usable resources (Davenport and Linder, 1994; Shang and Seddon, 2002). Only one theme emerged in this category, namely development of IT infrastructure.

4.4.4.1 Development of IT infrastructure

The theme describes how the implementation of an ERP system pushed SMEs to install standard technologies. The benefit was noted in five cases and it was mentioned six times during the interviews. However, the majority of SMEs which realised this benefit were not expecting it. An extract of interview quote is given below:

... “We changed our networking, it was not directly linked to Omega but we spend a lot of money on IT infrastructure and we also changed other areas ... we have put a much better infrastructure in and around our backups and servers etc.” (Respondent 4, C3).

Discussion

The new ERP system brought some unintended benefits to SMEs. After implementing an ERP system, the majority of SMEs found themselves installing standard IT infrastructure replacing aging infrastructure or technology. They had to buy standard servers, upgrade their network, and install standard operating systems and applications.

In some organisations, the implementation of an ERP system facilitated the replacement of aging IT infrastructure with a more robust system that was easier to manage and an enabled new business processes (Esteves, 2009; Ross, 1999). Ross (1999) argues that some organisations implement ERP systems to replace legacy systems built on out-dated technologies. The implementation of an ERP system thus helps to initiate efforts to standardise the IT environment, which in turn lowers cost of infrastructure support and maintenance.

Also, analysis suggests that the replacement of aging IT infrastructure or technology leads to improved IT infrastructure capacity which subsequently results in increased sales. For example, as expressed by one participant: ... *“We have seen tremendous growth in our sales and in many entities which would not have happened if we had not improved the basic system, IT infrastructure and our operations.”* (Respondent 4, C3). This relationship is shown in Figure 10.

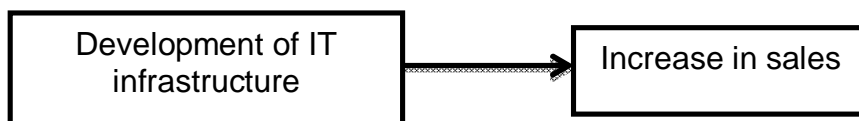


Figure 10: Development of better IT infrastructure can cause an increase in sales

4.4.5 Organisational Benefits

Shang and Seddon (2002) propose that organisational learning can change the way employees view an organisation and its environment. In this study, it was found that the implementation of an ERP system offered benefits such as employee empowerment and promoted organisational change.

4.4.5.1 Empowerment of employees

Empowerment of employees describes how the implementation of an ERP system brought about the development of new arrangements in which employees received recognition or promotion, increased job satisfaction and the acquisition of skills. Although the benefit was mentioned eight times during the interview sessions, it was

evident in a minority of cases. The few organisations which realised the benefit did not expect it, as exemplified by the following:

... “With the change management coming in we changed the whole structure. We spent less time doing certain functions. As a result, our organisational structure in general has changed. We have been able to re-skill our staff to get people do things more efficiently.” (Respondent 4, C3)

Discussion

Users were empowered through re-skilling and training on how to use the new system. As a result, they spent less time doing tasks and became more efficient. This developed confidence in the capacity of users to do their work.

Arbues and Ronaldo (2009), state that employees are empowered by giving them access to more information. Doughty (2004) extends this concept by adding skills; increased job satisfaction and increased self-actualisation as forms of empowerment.

4.4.5.2 Promotes organisational change

The introduction of an ERP system brought about organisational restructuring and the changing of roles within organizations. The change required employees to learn new behaviours and skills and to manage the effect of new business processes and restructuring. The theme was found in two cases and the conversational density was low. One participant described this benefit as follows:

... “As much as the benefit of getting a new ERP system, was having an integrated system; the ability to effect change management on our processes and on our people, on our admin and on our workforce was probably even more important to us. It was a massive opportunity which we used at the same time implementing the software and changing the way we operated. We re-tooled our business, our people; we re-structured some of our entities to match the better practises.” (Respondent 4, C3).

Discussion

The adoption of an ERP system helped firms to embrace changes in their current business environments. The process provided them with a systematic approach to deal with sub-standard organisational processes, tiresome administrative processes and impart employees with new skills. This finding confirms research by Esteves (2009) and Shang and Seddon (2000).

4.4.6 Discussion: The Benefits interdependence framework

The interdependency diagrams which emerged from the benefits themes were integrated into a final framework referred to in this study as the Benefits Interdependence Framework and is shown in Figure 11.

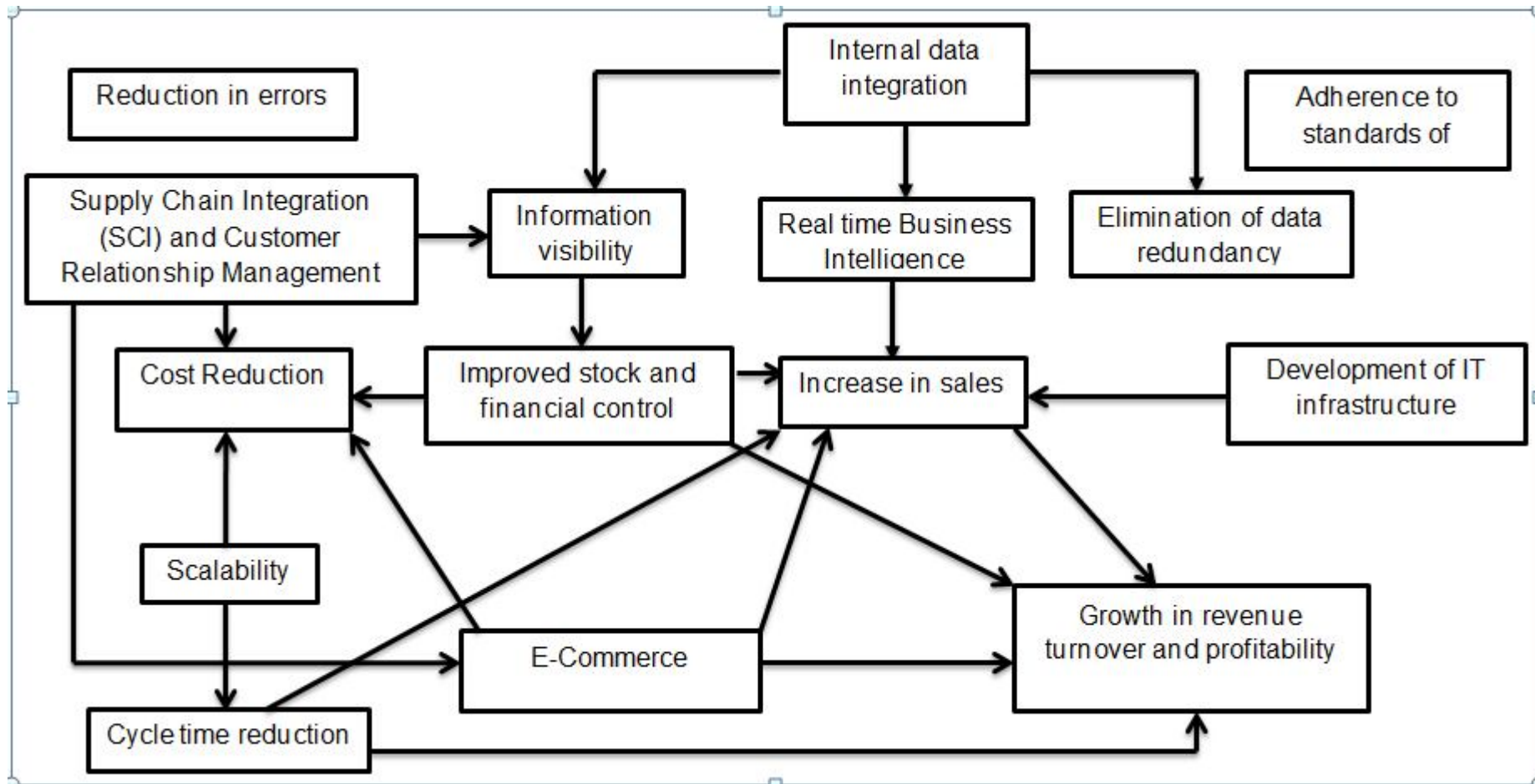


Figure 11: Benefits interdependence framework

Figure 11 shows that ERP benefits do not exist in isolation. Rather, some benefits are a manifestation of other benefits. Thus the model explains how the benefits of adopting ERP systems accumulate as they are realised by SMEs. It also shows the major primary benefits which are fundamental to the realisation of all other benefits. The next 2 sections discuss the causal benefits and resultant benefits.

4.4.6.1 The causal benefits

A causal benefit is the one which causes the realisation of another benefit. It's a situation where the second benefit is understood to be a consequence of the first benefit. In Figure 11 a causal benefit points towards other benefits indicating that it is the influencer of other benefits. Achieving the first benefit may stimulate the realisation of secondary benefits.

Analysis of the final framework indicated that internal data integration has the highest number of dependencies. There are 7 secondary benefits which directly or indirectly depend on its realisation. These include better information visibility; elimination of data redundancy; real time business intelligence; improved stock and financial control; cost reduction; increased sales and growth in revenue turnover and profitability. What this means is that the failure to achieve internal data integration may inhibit full realisation of these other benefits which directly or indirectly depend on it. Presumably, realising causal benefits first is important as many other benefits depend on them.

Also, analysis of the findings has shown that in addition to the fact that internal data integration; SCl and CRM and scalability are the ones with the highest number of dependencies, these benefits do not have other benefits which directly influence their realisation. Thus these benefits are independent. Other independent benefits which emerged from the study include: adherence to standards of practice; development of IT infrastructure; organisational change; reduction in human error and empowerment of employees. These benefits may be achieved easily.

The researcher also found that information visibility is one of the major secondary benefits to be realised during an ERP implementation. This is because it has internal

data integration and SCI and CRM which directly influence its realisation. These 2 are also major benefits to be achieved first during an ERP implementation.

The high conversational density of internal data integration; information visibility and SCI and CRM indicated that these are some of the major benefits to be realised first. Also, they were evident in the majority of cases investigated. Internal data integration and information visibility were evident in 6 and 7 cases investigated respectively. SCI and CRM were expected to be realised in 3 cases and were realised in all of them. Despite being evident in 3 cases only, the benefit received a significantly high number of text appearances in the analysis. It received 15 text appearances in 3 cases and this helped to highlight how important the benefit is. Scalability was expected to be realised in 2 cases only and it was realised in 3 cases. When compared to other benefits, the benefit had a relatively low conversational density. However, considering that it was only expected in 2 cases, the conversational density was reasonable. For this reason, the benefit was rated as a major one by the researcher.

4.4.6.2 The resultant benefits

This section looks at resultant benefits which emerged from the study. In the context of this study, a resultant benefit is defined as the final consequence or the final benefit in the benefit realisation process. The majority of other benefits point to these as the final benefits to be realised. For example, the realisation path of sales increase is as follows. Sales increase largely depends on achieving real time business intelligence; e-commerce; scalability; cycle time reduction; SCI and CRM; fully developed IT infrastructure; better information visibility; internal data integration and improved stock and financial control. Thus, the failure to achieve any of these prior benefits may not lead to the full realisation of sales increase within an SME.

Analysis of the final framework indicated that dominant resultant benefits of a successful ERP implementation would be growth in revenue turnover and profitability; sales increase and cost reduction. However, because the realisation of these benefits largely depends on the realisation of other benefits either directly or indirectly, these benefits are difficult to realise. This observation may help to explain

why growth in revenue turnover and profitability; cost reduction and sales increase were not evident in the majority of the cases investigated. However, sales increase; and cost reduction received significant attention during the interview conversations. The 3 benefits had a high conversational density. Benefits which are perceived to be difficult to achieve are marked in light brown in Table 11.

Benefits such as promotion of e-commerce; elimination of data redundancy; improved cycle time reduction; real time business intelligence and information visibility depend on the realisation of one or two other benefits hence they are relatively easy to achieve. These benefits are marked in white in Table 13.

4.4.7 Resultant ranking of the benefits from the study

The benefits that emerged in the study were ranked by the researcher from the following 4 perspectives.

- (i) The benefits which dominated by being evident in the majority of the cases investigated.
- (ii) The benefits which dominated by being mentioned most during the interview sessions (high conversational density).
- (iii) The benefits which dominated by being strongly influenced by other benefits (resultant benefits).
- (iv) The benefits which dominated by influencing most the realisation of other benefits (causality benefits).

The researcher assessed the benefits and ranked their significance according to the 4 perspectives. Table 11 gives a summary of the ranked benefits.

Table 11: Resultant ranking of ERP benefits

Position	Benefit	Number of cases where the benefit was evident	Frequency of the conversational density	Number of benefits which depend on the benefit (causality benefits)	Number of benefits which influences the realisation of the benefit (Resultant benefits)
1	Internal data integration	6	11	7	-
2	Information visibility	7	9	4	2
3	Real time business intelligence	6	8	2	1
4	Supply Chain Integration (SCI) and Customer Relationship Management (CRM)	3	15	4	-
5	Cycle time reduction	5	10	2	1
6	Sales increase	4	9	1	10
7	Development of IT infrastructure	5	6	1	-
8	Adherence to standards of practice	4	10	-	-
9	Cost reduction	3	11	-	6
10	Improved financial and stock control	3	7	3	3
11	Scalability	3	5	4	-
12	E-commerce	2	3	3	1
13	Organisational change	3	5	-	-
14	Growth in revenue turnover and profitability	3	3	-	11
15	Reduction in Human Error	3	3	-	-
16	Elimination of data redundancy	2	2	-	1
17	Empowerment of employees	2	8	-	-

Key

Internal data integration	Independent benefit, easy to achieve
Information visibility	Benefit influenced by 1 or 2 other benefits and relatively easy to achieve
Sales increase	Benefit depends on other benefits to be fully realised. Benefit hard to achieve

4.5 ERP SME Risks

Organisational risks are described as inevitable and managers may not have control over their occurrence (Keil et al., 1998). This section deals with the risks evident in the study. A total of twenty one themes were evident. Table 12 summarises the categories and themes which emerged from the findings.

Table 12: ERP risk themes

Risks	Risk Category		Theme	
	1	Inadequate organizational fit	1.1	ERP re-implementation
			1.2	Lack of vendor transparency
			1.3	Selecting wrong ERP supplier
			1.4	Selecting incorrect ERP system
	2	Inadequate skill mix	2.1	Insufficient internal expertise
			2.2	Lack of consultant skills
	3	Inadequate user involvement and training	3.1	Ineffective communication
			3.2	Inadequate user involvement
			3.3	Resistance to the new system
			3.4	Lack of discipline over the use of the system
	4	Inadequate management strategy and skills	4.1	Poor data migration
			4.2	Ineffective system change-over strategy
			4.3	Budget overrun
			4.4	Inadequate management skills
	5	Inadequate software systems design	5.1	Lack of information traceability and visibility
			5.2	Incorrect system setup
			5.3	Inadequate hardware infrastructure
			5.4	Lack of system security
			5.5	Unclear/Misunderstand requirements
			5.6	Lack of functionality fit in module
			5.7	Multiple systems

Table 13 provides a summary of risks evident in each case and the corresponding conversational density (how often each risk was mentioned during interview sessions).

Table 13: Risks evident in each case and the corresponding conversational density

Risks		Cases investigated and corresponding text appearances										Total text appearances per realised risk
Inadequate organizational fit		C1	C2	C3	C4	C5	C6	C7	C8			
1.1	ERP re-implementation	X 2	X 1			X 2	X 1				6	
1.2	Lack of vendor transparency	X 1	X 1		X 1	X 2					5	
1.3	Selecting wrong ERP supplier		X 1			X 2				X 2	5	
1.4	Selecting incorrect ERP system					X 2					2	
Inadequate technical skills												
2.1	Insufficient internal expertise	X 1	X 2	X 3		X 2	X 5			X 1	14	
2.2	Lack of consultant skills	X 2	X 2			X 3	X 2	X 1	X 2		12	
Inadequate user involvement and training												
3.1	Ineffective communication	X 2		X 1					X 1		4	
3.2	Inadequate user involvement						X 4	X 2	X 2		8	
3.3	Resistance to accept the new system			X 4	X 2		X 2	X 1	X 1		10	
3.4	Lack of discipline over the use of the system					X 1		X 1	X 1		3	
3.5	Inadequate preparation			X 2	X 2	X 1		X 1	X 1		7	
Inadequate management strategy and skills												
4.1	Poor data migration		X 3	X 3	X 1	X 2				X 1	10	
4.2	Ineffective system change over strategy	X 3		X 2	X 1	X 2				X 1	9	
4.3	Budget Overrun		X 2			X 2					4	
Inadequate software systems design												
5.1	Lack of information traceability and visibility		X 1	X 1		X 1				X 1	4	
5.2	Incorrect system setup	X 1			X 1	X 6		X 1	X 2		11	
5.3	Inadequate hardware infrastructure		X 3	X 1	X 2					X 1	7	
5.4	Lack of system security		X 1					X 1			2	
5.5	Unclear/Misunderstood changing requirements	X 2		X 1	X 1	X 1	X 1	X 1			7	
5.6	Lack of functionality fit in module	X 2	X 6	X 3	X 4	X 10	X 1	X 2	X 2		32	
5.7	Multiple systems		X 3			X 2				X 1	6	

Key

X	2	The risk was evident in the case; it was expected and it had 2 text appearances in the interview transcript (i.e. it was mentioned 2 times during the interview sessions)
X	3	The risk was evident in the case and it was not expected. It was mentioned 3 times during the interview sessions.
X	1	The risk was expected to be realized in the case but it was not. It was mentioned once during the interview session.
		The risk was not evident in the case.

As shown in Table 13, the yellow dominates. This implies that the majority of the risks realized were not expected. The green is scarce indicating that few risks were expected. Red is also scarce implying that very few expected risks were realized. The next section looks in detail at the risk categories and themes which emerged from the study.

4.5.1 Inadequate organizational fit

With regard to risks for ERP implementations, participants were asked about the challenges they faced as a result of implementing an ERP system. One major category which emerged is inadequate organizational fit of the ERP system. Four themes emerged in this category. These are ERP re-implementation; lack of vendor transparency; selecting the wrong ERP supplier/vendor and selecting the incorrect ERP system.

4.5.1.1 ERP re-implementation

ERP re-implementation refers to the act of implementing an ERP system more than once. The risk was distinctly visible in the study. Four of the eight cases had a system re-implementation while 2 had a high probability of facing this in the near future. The ERP re-implementation occurred in one of two ways. The first scenario was when the initial implementation failed to yield the desired results resulting in the same system being implemented for a second time. One participant described this scenario:

... *“It (referring to an ERP system) was working but not as we expected, ... so after the first year we had to have a total reinstall changing some basic parameters “* (Respondent 1, C1).

The second scenario was when the initial ERP system failed to perform and was abandoned completely. Subsequently, a different ERP system was installed. One of the participants said:

... *“When I came here the ERP system we used was “Omega” but we changed shortly to “Alpha”. (Respondent 7, C5).*

Discussion

The re-implementation had a negative financial impact to SMEs. The process was expensive for them. As described by one participant: ... *“We had to look for another system and it was expensive for us”* (Respondent 7, C5). However, some SMEs had a free re-installation as it was negotiated in the initial contract. One of the participants described this scenario: ... *“Other than time, effort and business disruptions, it did not cost us extra money”* (Respondent 1, C1). The bearing on cost depended on the nature and scope of re-implementation. Those that had signed a fixed term contract did not incur extra costs as compared to those who negotiated an open contract. As described by one participant: ... *“I made a fixed term contract. ... we went for a fixed price implementation. We agreed on a price so I did not care how many hours they spent on my site, I did not care if there were 50 people on my site; it was a cost to them and not to me”* (Respondent 2, C2). Some SMEs failed to recognize the risk of scope expansion in terms of time and cost. Although ERP re-implementation may have been discussed in fragmented topics, the literature does not explicitly cite ERP re-implementation as a risk.

4.5.1.2 Lack of vendor transparency

This theme describes how SMEs were subjected to a lack of transparency on what the ERP systems could do. The risk was evident in four of the cases investigated. Although there might have been other factors which contributed to the lack of transparency, there was a general consensus from the interviewees that ERP

vendors were not sincere or transparent in their communication. The following statement was made by one participant:

... “When they sell an ERP system they tell you it can do this, it can do that but (speaking slowly) it’s very different when it comes to the actual implementation and you want to do what they demonstrated to you in an hour. There is a lot of stuff they show you and say can be done but it’s a lot more difficult to get there in practice” (Respondent 4, C3).

One participant, who was asked to explain some of the things that were not communicated well by their ERP vendor, gave the following response: ... *“Sales people are sales people. We had a lot of issues with part numbers in the system, the system could not accommodate our part numbers ... when they do the marketing of their system they do not tell you that you must customise every single form for your company” (Respondent 7, C5).*

Discussion

ERP vendors distorted or overstated what the systems could do. They gave a marketing speech to SMEs. The SMEs realised after implementation that more customisation was required than had been discussed and that maintenance costs were not as per presentations. This tended to surface together with system glitches, after implementation. Consequently, SMEs were disappointed in vendors. The findings show that the level of communication between the ERP implementation partners plays a significant a role in the implementation outcome.

The literature is relatively silent about the lack of ERP vendor transparency. Previous studies such as those done by Dixit and Prakash, (2011) and Kale et al, (2008) reported that SMEs have a low level knowledge about ERP vendors and applications. Thus they are vulnerable to marketing speeches. Also, SMEs regard ERP systems as the solution to all their business problems and process defects (Dixit and Prakash, 2011; Kale. et al, 2008). ERP vendors appear to have capitalised on

these high expectations and lack of knowledge and have overstated what their systems can do.

Lack of vendor transparency was one of the factors which contributed to ERP re-implementation. Vendors did not openly explain problems that could be encountered after implementing an ERP system. They stated that the system could perform particular functionalities without revealing the challenges that could be faced after implementing the system. When Respondent 1 was asked if they experienced any communication distortions from their vendor, the participant said: ... *“One of the disadvantages is the very same thing, that’s why our first implementation was a problem because we asked questions like, can it (referring to the ERP system) do this and they (referring to the ERP supplier) said yes, and it can do that. They did not say yes, but these are the consequences. They just said yes it can do it. So we ended up with a yes it can do it but we didn’t know the consequences (referring to the post implementation problems)”* (Respondent 1, C1). Figure 12 illustrates that lack of vendor transparency influences the realisation of ERP re-implementation risk.

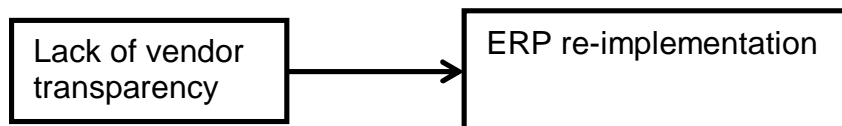


Figure 12: Lack of vendor transparency can influence ERP re-implementation

4.5.1.3 Selecting wrong ERP supplier/vendor

The results of the study revealed that some SMEs selected incorrect ERP vendors. However, few organisations realised this risk. One participant described how they realised the risk:

... *“We mapped all the processes and we told them (referring to the ERP supplier) exactly what we wanted and we just battled to get going ... at the end they (referring*

to the ERP vendor) *said to us, (high voice) they are not the expert so they recommend us somebody else* (Respondent 7, C5).

Discussion

The findings show that selecting the correct ERP vendor for an ERP implementation and its long-term support may determine the success or failure of an implementation. It is important for SMEs to find a vendor with the right relationship skills and competencies for the purposes of on-going support. Maintaining ERP systems after implementation is a problem (Iskanius et al, 2009). As evident in the study, where there was a mismatch between ERP vendor competencies and what SMEs desired, where ERP vendors failed to offer support after implementation. Participant 7 made the following comment: ... *“So they (referring to the first vendor) recommended to us Fact (pseudonym for a consultant company), and then we spoke to Foremost. They took over the contract. With Fact, it was just a business relationship that did not work out. Everything that was wrong in the system was always our mistake. Then I said I cannot work like this, just come and fix the problems. It was extremely expensive”* (Respondent 7, C5).

Sumner (1999) argues that it is important to get external expertise including vendor support in order to achieve a successful implementation. In support of this, one participant commented: *“What people do not realise is this: a vendor is someone who you are going to be in a relationship with for a long time. So you need to make sure that your personalities agree and your values and core-ideas are the same because otherwise it will turn out to be a mess”* (Respondent 4, C3). A good working relationship between consultants and the organisation's project team may result in transfer of important skills in both directions (Bowen, 1998).

The findings indicated that once an inappropriate supplier or vendor has been chosen, the choice has a ripple effect. As evident in this study, making a poor choice impacted negatively on business relations and consumed extra resources. The SMEs faced consequent challenges such as having to pay for additional consulting. Having the right relationship is particularly important given that most SMEs do not have devoted, full-time implementation teams and they are usually resource-constrained

(Achanga et al., 2006; McAdam, 2002) hence they rely even more on vendors to do the implementation work.

It is argued in the literature that when compared to LEs, SMEs do not have much influence over ERP vendors and consultants (Delone, 1988). As a result, they get low level of service and preference. This was certainly evident in this study, as described by the following participants: ... *“The consultants did the implementation hurriedly so that they finish and get their money...”* (Respondent 10, C8).

... *“We thought the people implementing the system were professionals (...) the local support was a bit disappointing in the beginning”* (Respondent 2, C2).

To some extent, these quotes reflect a lack of commitment from vendors. These findings are consistent with Singh et al.'s, (2010) findings that companies do not receive sufficient technical support from system vendors. This challenge is aggravated by the fact that the majority of SMEs do not have an existing IT department hence they rely on vendors to support their infrastructure (Kale et al., 2008). One participant had the view that that, to be a priority in an ERP implementation project, SMEs should avoid using large ERP vendors. To quote: *“If you are a family business do not use a big implementation company to implement your system because you are not going to like it, you will be frustrated with your vendor or implementation partner”* (Respondent 4, C3).

It is important to note that selecting an ERP system and vendor is a critical process (Onut and Efendigil, 2010). The decisions made at this stage will affect the organisation either positively or negatively in the future. In most cases, after product demonstrations from vendors, organisations are overwhelmed by product functionality and some criteria which determine the success or failures of the system are overlooked (Hurbean, 2009). The problem is compounded by the fact that the majority of available methodologies for choosing an ERP system focus more on system functionality than on organisational fit (Umble et al., 2003). As a result, SMEs may overlook the importance of selecting the correct vendor. The risk of selecting the wrong ERP vendor or supplier was also reported by Ojala et al. (2006).

4.5.1.4 Selecting incorrect ERP system

Selection of an ERP system which does not conform to organisational functions was a risk evident in this study. However, not many companies realised this risk. Interviews showed that some SMEs made the mistake of selecting the wrong ERP system, as exemplified by the following:

... “There were certain transactions which Omega could not do, they were just too complicated. When we did them they always created problems. She (referring to a consultant) comes here every month, sits here for the whole week and corrects the errors. We will go through the whole system, check for errors but they will resurface and I said we cannot work like that. We had to be independent of a consultant. The system became complex such that we could not manage it” (Respondent 7, C5).

... “We once had Omega (the company now uses Alpha) and we enquired a lot about different systems... even the Omega upgrade was not totally suitable for us; so we went out and contacted a lot of companies with different ERP systems” (Respondent 7, C5).

Discussion

It was found that ERP applications could not work independent of consultant support. This was also an unexpected, additional cost to the company. This finding concurs with Kaufman (2007) who stated that selecting a wrong ERP package may drain the IT budget. In addition, it was found that ERP systems could not perform the required transactions and were unsuitable for the company. The source of the problem might have been that SMEs did not follow proper procedures for evaluating and selecting an ERP system. As reported by one participant: *“In terms of why we would go either Omega or Beta we did not get a consultant to score for us. We looked at the demonstrations that we did with the vendors. There was a sales guy and a technical guy (...) who demo’d it to us and we were trying various options; what about this; can you do this for us, can you do that?”* (Respondent 4, C3). Hurbean (2009) argues that selecting and evaluating an ERP system is a complex process which is characterised by many risks.

Kaufman (2007) argues that not all ERP systems are equal and organisations should consider functional compatibility when selecting them. A suitable ERP system is able to integrate all the key business functions of an organisation. Karande and Chakraborty (2012) argue that for an organisation to survive in a global competitive environment, it has to implement an appropriate ERP system. Failure to select the right ERP system affects the overall performance of an organisation. Specifically, selecting the incorrect ERP system may result in a misfit between the package; organizational goals and business processes (Onut and Efendigil, 2010). The risk of choosing the wrong ERP system was reported as a critical risk in studies by Iskanius (2009) and Iskanius (2009) and Ojala, et al. (2006).

As indicated by respondent 7 above, selecting the wrong ERP system may result in system re-implementation. Figure 13 shows that ERP re-implementation can be caused by selecting the wrong ERP system.

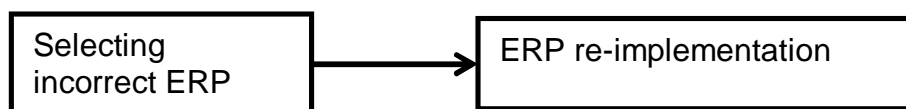


Figure 13: ERP re-implementation can be caused by selecting the wrong ERP system

4.5.2 Inadequate skills

Two themes emerged in this category. These were both technical and included insufficient internal expertise and lack of consultant skills.

4.5.2.1 Insufficient internal expertise

The majority of the SMEs (six out of eight) did not have internal IT Departments. As a result, this theme was one of the dominant risks in the study. Respondent 7 said:

... *“We do not have an IT department here so our accountant is the administrator of the system... He fixes our computer issues”* (Respondent 7, C5).

Discussion

The analysis indicated that the majority of SMEs relied on consultants for most of their technical tasks and challenges. They had to pay money for every task no matter how small it was. Participant 4 emphasised the need for an in-house IT person when implementing an ERP system to avoid project collapse: ... *"In terms of the initial hiccups, you need help internally. It is vital otherwise the whole project will go horribly wrong. Here with Omega for the first time we could not print invoices. You have lots of people looking at you as the project manager of this thing and you are not sailing. There will be lots of pressure on you and then the problem will be fixed by a simple technique; just loading a patch or making dot matrix printer drivers loaded (...) that relief is tangible. In terms of internal resources you need a technical guy"* (Respondent 4, C3). There was also a lack of business analysts with both business and technology knowledge. SMEs relied on what they were told by ERP vendors. This problem was exacerbated by the lack of transparency from vendors. There was a need for a business analyst who would look at both business and technology issues and align the two. As exemplified by the following statement, SMEs were limited to what the vendors could do: ... *"They (referring to ERP vendors) came and we explained to them how our system works (...) and they said we can do it. They knew better because we did not know their system"* (Respondent 1, C1).

Grabski, et al. (2003) argues that training provided by vendors and consultants provides additional resources to compliment lacking internal skills. This is a valuable aspect of the vendor relationship and may reduce potential risks associated with the lack of internal expertise. Grabski, et al. (2003) and Staehr, et al. (2006) has reported lack of in-house skills or insufficient internal expertise as a potential risk of implementing ERP systems.

4.5.2.2 Lack of consultant skills

In this context, the word 'consultant' refers to any external project employee. These are normally employees of the ERP vendor, supplier or implementation partner. Lack of consultant skills was the most dominant risk in the investigation. As described by

certain participants: ... *"When we started using it (referring to the ERP system), it wasn't setup correctly by the Alpha consultants"* (Respondent 1, C1).

... *"As part of our implementation, the company that did our implementation XY, had like three four people who were training and at the same time doing our installation"* (Respondent 2, C2).

... *"Yeah, but the problem I think they were the wrong consultants. If I look back they were the wrong consultants because they were used to the old big system and they had to teach themselves the new small system"* (Respondent 7, C5).

Discussion

The informants unanimously agreed that the risk was significant irrespective of the ERP product or industry sector. The findings indicated that the majority of the SMEs implemented their ERP systems by way of outsourcing skills. However, none of the organisations had a formal methodology to evaluate the technical consultants. Consequently, the majority of them found that incompetent consultants were a major challenge.

It was found that some consultants did not possess sufficient knowledge about the systems they were implementing. Besides the lack of expert knowledge, consultants also lacked the necessary experience and could not provide the necessary technical support. In addition, consultants could not convincingly train employees; rectify problems timeously; and were unable to set up the systems correctly, among other difficulties. The SMEs battled to continue with their daily operations as a result of this. Participant 7 stated: ... *"Then they lost the key guy (consultant), who was full time allocated to us. He then went to Australia then we battled to get going. So we said forget it, then we went to someone else"* (Respondent 7, C5).

Poor consultant knowledge results in system breakdowns and operational failures (Iskanius, et al., 2009). These were the major challenges realised in this study. Generally, ERP implementations are complex in nature hence most companies prefer to hire consultants to select, configure and implement an ERP system for them

(Al-Mashari, Zairi and Al-Mudimigh, 2010; Davenport, 1998). This because consultants possess experience gained from previous implementations hence they can act as knowledge providers to alleviate a lack of knowledge within organisations (Arens and Loebbecke, 1997). They have in-depth knowledge of the software hence they determine the success or failure of an implementation (Welti 1999). Quite often SMEs lack internal IT competencies hence they depend on external consultants and ERP vendors for support (Chen et al., 2008; Hustad and Olsen, 2011). However, a study conducted by Singh, et al., (2010), found that organisations could not receive satisfactory consulting advice from the ERP consultants.

An organisation cannot entirely depend on consultants because consultants are external people and they do not have full knowledge of an organisation's operations (Grabski et al., 2003). In addition, the findings of this study indicated that vendors and consultants both lack transparency and enough skills and consequently cannot be fully relied upon. Given the high risk involved in ERP implementations, it is important to make sure that consultants are genuinely qualified. This is because they play a significant role in filling some of the skills gaps found in SMEs during ERP implementations. According to Kumar et al. (2003, p. 798), *"The challenges of ERP adoptions are compounded if the firms end up partnering with unsuitable consultants, which makes selection criteria for consultants very important"*.

4.5.3 Inadequate change management strategies

In the context of ERP implementations, change management refers to the processes, activities and methodologies needed to foster employee understanding about the organizational shifts and business process reengineering initiatives (Al-Mudimigh et al. 2001). Effective change management processes can result in a successful ERP implementation (Al-Shamlan and Al-Mudimigh, 2011). Al-Mudimigh et al. (2001) suggest that tools for change management include leadership, communication, training, planning, and incentive initiatives. Under this category, four themes emerged: inadequate communication; inadequate user involvement; inadequate planning; resistance to the new system and lack of discipline over use of the system.

4.5.3.1 Inadequate communication

One of the most challenging tasks during ERP implementation is communication (Welti, 1999). This theme highlights the communication pitfalls which were experienced by SMEs during ERP implementation. The risk was realised in a minority of the cases investigated. Inadequate communication occurred during ERP implementation. As described by one of the participants: ... *“The design objective was not clear; it was forced from top management ... they just told us; we want you to implement this system”* (Respondent 9, C7).

Discussion

It was evident in the study that not all stakeholders were well informed about the implementation of the new system and the need for the new system was not communicated well to employees. This affected the way employees embraced, perceived and used the new system.

Slevin and Pinto (1987) argue that communication covers the provision of an appropriate network and required data to all key players in the project implementation. The attitude of senior managers affects how users perceive a project (Gargeya and Brady 2005). Many companies come up with a communication plan which issues regular reports to employees so that they are kept updated on the impact of system on their jobs (Cameron and Meyer, 1998). Bancroft et al., (1998) argue that among other details, the communication plan should include the rationale for the ERP implementation; change management strategies and tactics and contact points. In addition, Sumner (1999) states that communication plans should include scope, objectives, and tasks of an ERP implementation project. In the literature, the problem of lack of communication has been reported by Staehr et al. (2006). Similarly, Appleton (1999) put forward the argument that soft skills such as communication and team building are necessary for the successful implementation of an ERP system.

4.5.3.2 Inadequate user involvement

Inadequate user involvement was a risk evident in the study. However, few companies acknowledged having realised this risk. In this context users included

senior managers, middle managers, and the lower level staff who interacted with the system on a daily basis doing duties such as data capturing. Respondent made the following statements: *“They (referring to employees) complained that we (management) just did our preparations without them and we called them to be part of us last minute; there was a big problem there”* (Respondent 10, C8).

... *“The design objective was not clear; it was forced from top management. You know people tend to get information from UK, South Africa so they just told us; we want you to implement this system”* (Respondent 9, C7).

... *“You find that everything that was wrong people would say it’s your (referring to the manager) system (...) I realised that the majority of people were not doing their work, the system was fine, it was only a matter of attitude”* (Respondent 10, C8).

Discussion

The analysis indicates that there was a “them” and “us” problem between senior management and lower-ranking staff. As a result, low-ranking users did not comprehend the new system. They were not cognisant why their organisation was implementing a new ERP system and as a result they developed a negative attitude and resentment towards the system.

Inadequate user involvement has been reported in previous studies such those done by Iskanius (2009), and Ojala et al., (2006). Summer (2000) reported it as a major risk. Users’ involvement is important to obtain user support and acceptance (Cameron and Meyer, 1998; Clemons, 1998; Grabski et al., 2003). If a system is delivered to users who do not have system ownership they will not use it. Involving users in the project gives project managers an opportunity to address user requirements and concerns, and to address these via training (Best, 1997).

Inadequate user involvement was as a result of inadequate communication from senior management. As evident in the following statement: ... *“Initially, the users did not accept the new system because they did not know why we removed the old system”* (Respondent 10, C8). Figure 14 shows that inadequate communication can

result in inadequate user involvement and inadequate user involvement can cause ineffective communication. The two risks influence each other and their occurrence cannot be separated.

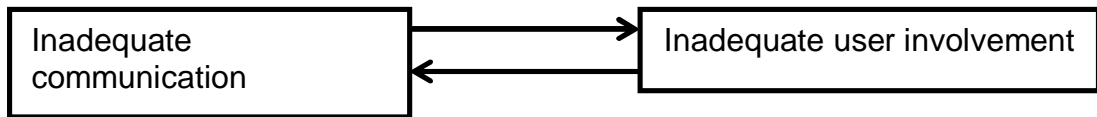


Figure 14: Ineffective communication results in inadequate user involvement and ineffective communication can be caused by inadequate user

4.5.3.3 Resistance to the new

It emerged that, in some of the cases, employees resisted using the new system. The risk was dominant and it had a relatively high conversational density. Some participants indicated how employees resisted the new system in the following statements:

... "So when I came in I had to take over the IT function from the previous person and there was a lot of resentment, negativity, gangs sprang up just because the system was different from what they had. (...) at management level, there was a lot of resistance" (Respondent 4, C3).

... "I think I must say initially people were not very keen to use the system because they did not understand it (...) Obviously with any new changes coming into place you face resistance. It's something we took up unwillingly but eventually, we all got used to it and say no, no, no, this is advantageous" (Respondent 9, C7).

Discussion

It was found that employees did not want to use the new system because it was different from what they had previously used. They became antagonistic about its use. People wanted to continue using the old system because they did not understand the need for the new system.

Kale et al. (2008) argue that one major reason why ERP implementations fail is because companies treat them as automation projects rather than one which involves a change management process. As a result, most ERP systems end up being implemented but not are used effectively because people are not ready to accept the change. Iskanius, et al. (2009) also reported resistance to the system as a potential ERP risk.

The findings show that resistance to the new system was caused by lack of proper communication on the need for a new system and lack of user involvement. One participant commented that: ... *“Initially when Beta was introduced people were very sceptical, they did not want the MIS (referring to the ERP system) because we did not know where we were going; what is it for and what the advantages were”* (Respondent 9, C7). The employees were not well versed with what was going on in the company and so as a result they did not know where the company was going and what the new system was for. Also, they lacked confidence in the new system and therefore doubted it. If employees had been educated first on the need for a new system they may have felt that they were part of the project and these problems could have been eliminated. Figure 15 illustrates that ineffective communication and inadequate user involvement cause employees to resist the new system.

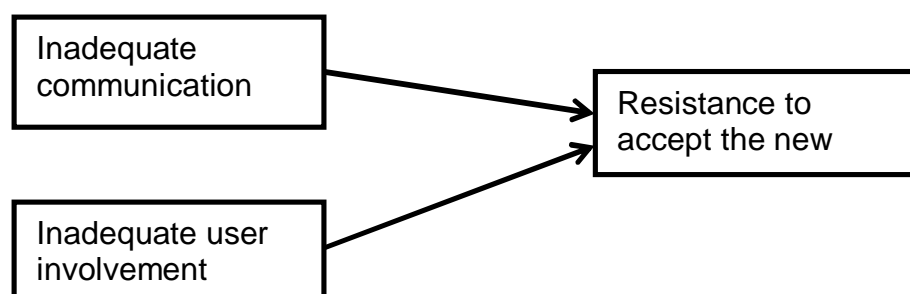


Figure 15: Ineffective communication and inadequate user involvement can cause employees to resist the new system

4.5.3.4 Lack of discipline over the use of the system

The study found that users lacked discipline over the use of the new ERP system. The problem was evident in a minority of the cases and the conversational density was low. The following statements by the participants highlight this lack of discipline: ... *“People think they know how to do it (referring to using the new system) and they do it the way they think it should be done and the system accepts it. Come end of year when you look on your financial statements and that’s when you say this does not make sense. Then for the whole year they (referring to system users) had either forgotten to put the landing cost of imported items into the system or something like that. Fixing it afterwards is a massive job, it’s a big job. I am just mentioning an example”* (Respondent 7, C5).

... *“In some instances, I would say, ok, let’s enter the data together in the system and when you run the report which was initially wrong, you get correct results”* (Respondent 10, C8).

... *“You find you ask somebody to process a journal entry in the system like into the general Ledger for example you find someone going back to the old system because they think the new system is too slow. It’s too slow because he does not know how to operate it. He goes back to the manual system and he posts summarised figures for the month instead of going through voucher by voucher”* (Respondent 9, C7).

Discussion

Instead of using the system for entering all the required data, users reverted back to the previous system. The new ERP system was functionally working but people made it dysfunctional by not entering data as required. This carries through to poor data in reports. Some of the employees preferred to use the old system instead of the new system because they did not recognise the benefits of the new system in their everyday work and were not comfortable with it.

This finding is consistent with studies by Peng and Nunes, (2007). Singh, et al. (2010) obtained similar results where operational staff captured data incorrectly on a system which need high data accuracy to function successfully. Rework costs are usually high and employees should be helped to understand the significance of data

quality in an integrated environment (Staehr et al., 2006). Ojala, et al. (2006) reported that the lack of disciplined use of the system is a key risk in ERP implementations.

Resolving some of the problems caused by not entering data correctly was not easy. It was a lot of work for the SMEs who are usually resource constrained. One respondent emphasised the need for responsible people during an ERP implementation: ... *“A system is highly dependent on the people who put information into it. If they do not think about what they do, they stop the whole system. You can only use people that are responsible to input any data into the system”* (Respondent 7, C5).

Lack of discipline in the use of the system was as a result of resistance to it. This negative attitude is exemplified by the following statement: ... *“The bottom line is because they were negative, they were not entering all the required data (...) the system was ok, it was the people entering the data (...) our people did not have good attitude”* (Respondent 10, C8). Negative attitudes originated from inadequate communication and inadequate user involvement. Figure 16 shows that the lack of discipline in the use of the new system is as a result of resistance by employees to accepting the new system.

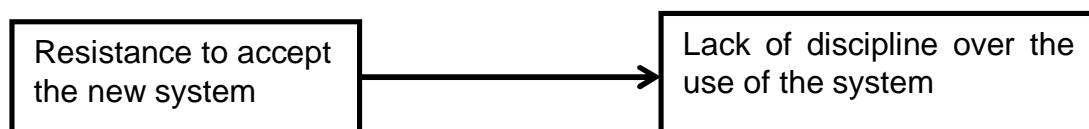


Figure 16: Resistance to accept the new system results in lack of discipline on the use of the new system

4.5.4 Inadequate management strategy and skills

Under management structure and strategy, three themes emerged; these are poor data migration; ineffective system change over strategy and budget overrun.

4.5.4.1 Poor data migration

Data migration is the process of transferring data from one system to another. In this case the process involved the transfer of data from the old system to the new ERP system. The process although necessary, was perceived to be risky. It was evident in the majority of the cases investigated and it yielded a relatively high conversational density. The risk was given a strong emphasis by those who realised it. The following are examples from participants' interviews:

... *"Data migration was a painful process. Personally I had to do a lot of clean up. The system that we had previously, to get the data out was quite difficult. (...) Things like sales history; we ended up loading things from scratch. Like customer accounts, we printed certain records and we punched them in from the front desk. We exported to Excel (referring to Microsoft Excel) and we checked the integrity"* (Respondent 4, C3).

.... *"The data had to be exported in Excel and re-imported (...) we faced a lot of challenges. ...it had to be manually adjusted; every single customer in Microsoft Excel because Beta didn't export into Excel but it exported into comma delimited files. It was a lot of work"* (Respondent 2, C2).

... *"As for the part numbers, all the information was not there, (...) the conversion was not as clean as we thought it would be"* (Respondent 7, C5).

Discussion

The findings indicated that data migration was a painful process. It was demanding both in terms of the amount of work and the manpower required. The data had to be exported to Microsoft Excel, cleaned and checked for integrity before it was imported into the new system. In situations where exporting to Microsoft Excel failed, the data had to be captured into the new system manually. The process of extracting data from the old system and loading it to the new system was complex. The complexity was caused by a lack of knowledge about how the data in the old system was stored and structured. As described by one participant: ... *"It was not just extracting it into Excel. You had to put it to CSV files. It was not SQL based, it was a flat file structure*

where the developer had changed the names of the tables. We didn't know the name of the inventory table for instance and it was difficult to identify the information. A lot of data had not been cleaned up" (Respondent 4, C3).

In addition, data was stuck in the old system due to old technology which prevented easy extraction of the data. As described by one of the participants: ... *"The data was old, it was in a DOS based system so you could not migrate it over to the new system easily"* (Respondent 2, C2). Also, there was a compromise on data quality. The take-on values in the old and new system did not match. Some useful data was lost during the migration process. As described by one participant: ... *"You know, you have to balance all your accounts from one system to the other. The take-on values did not match everywhere. We could not bring in all the detail we wanted so we lost a lot of history"* (Respondent 7, C5). Previous studies by Iskanius, (2009) and Ojala, et al. (2006) have reported poor data conversion as a risk faced during an ERP implementation.

4.5.4.2 Ineffective system change over strategy

This was the most feared risk mentioned in the study. However, few companies faced major challenges regarding the process of switching from the old system to the new system. The following quotes illustrate how SMEs expected and feared the risk:

... *"My main concern was that when we moved over to Alpha; the Alpha consultants said that there was no need to run a parallel system. It would work from day one which I think is a high risk strategy in any event ...It worked from day one but if we were running a parallel system we could have done a re-implementation earlier"* (Respondent 1, C1).

... *"The implementation was a major change over. All ERP system change is a major change over. All processes will come to a stand still for that swap over. We took the whole weekend to go live ...We bought 2 computers. The old one we kept it going. It was the Omega system. Then we bought the whole new server. The Alpha guys were doing whatever they wanted. They did the testing, transfers everything, then*

one weekend we said we are going to switch off the old one and we are going to switch on the new one. It was not easy!” (Respondent 7, C5)

... “Our biggest associated risk was not being able to trade. We have a 24 hour business so any down time is a direct loss of money. So that was our biggest risk, we had to make sure the first day we went live, the system would work properly and I think that was our biggest risk from start. We spent a lot of time to make sure that would not happen. We had a dry run, in other words, Sunday is the only day we do not do business so we started the new system on a Sunday. We had all the personnel here; we had a dry run making sure everything works proper for Monday when we actually went live with the system” (Respondent 6, C4)

Discussion

The majority of the companies requested a parallel run of the old system and the new ERP system but none of them followed this approach in the end as it was vetoed by the consultants. All the companies followed a direct change over approach and it proved to be less disastrous. This may be attributed to careful planning, testing and preparation before the day of the changeover. The SMEs bought hardware for testing purposes and a dry run of the system was completed. Also, a suitable day was chosen where downtime was acceptable.

4.5.4.3 Budget Overrun

It emerged that budget overrun was a risk. However, the risk was not so popular because the majority of SMEs did not budget for the implementation project. In the following statement, one respondent indicated that they incurred budget overrun:

... “We had half a million and when we finished because of implementation costs it was close to a million when we stopped. It almost doubled our budget” (Respondent 7, C5).

Discussion

Some investigated companies used more money during ERP implementation than they had anticipated. C5 almost doubled its budget. The analysis revealed that

budget overrun was caused by changes in project scope. As described by one participant: ... *“There were one or two changes that we did and they were not in the scope of our work so I paid extra cost for that (...) your costs can go into thousands of Rands if your scope of work is not done properly but it is difficult to speculate if it is a new system that you have never used before”* (Respondent 2, C2).

Generally, ERP projects have a high failure rate with consequences such as cost overruns and bankruptcy (Benaroch and Kauffman, 2000; Bingi et al., 1999; Davenport, 1998; Eckartz, et al., 2009; Griffith et al., 1999; Keil et al., 1998; Markus et al., 2000). These cost overruns are a result of unpredicted customization, business process re-engineering; training, and consulting services (Wu et. al. 2008). Markus et al. (2000) and Sumner (2000) added that additional costs come from short-term hired employees, overtime labour and re-skilling and training of employees during the project roll out. As a result of these costs, most companies end up terminating their ERP projects prematurely (Abdinnour-Helm et al., 2003; Wu et. al. 2008).

Eckartz, et al., (2009) argue that if companies do not come with a business case, they end up facing challenges such as changes in scope which subsequently result in budget overrun.

The lack of consultant skills can result in continuous billing during system maintenance resulting in budget overrun. As described by one participant: ... *“It was all money out, people that were doing conversions for us and sorting out issues. Stupid stuff! Like you know, it took one guy 3 days to just get our invoice printing in a nice format and our company logo in the right place. It was always cutting off lines here and there; we could not get enough characters on to this line. He spends literally 3 days to do that simple small task. Just to generate that”* (Respondent 7, C5). Budget overrun was also caused by lack of vendor transparency about the amount of customisation and maintenance that would be required. As reported by some of the participants: ... *“They (referring to ERP vendors) do not tell you that you must customise every single form for your company”* (Respondent 7, C5). Another participant commented: ... *“I think one of the main things is you will never really know until you have used it (referring to an ERP system) is how much constant*

maintenance it will cost you” (Respondent 4, C3). To sum up, Figure 17 show that budget overrun may be caused by both lack of vendor transparency and lack of consultant skills which results in continuous maintenance costs.

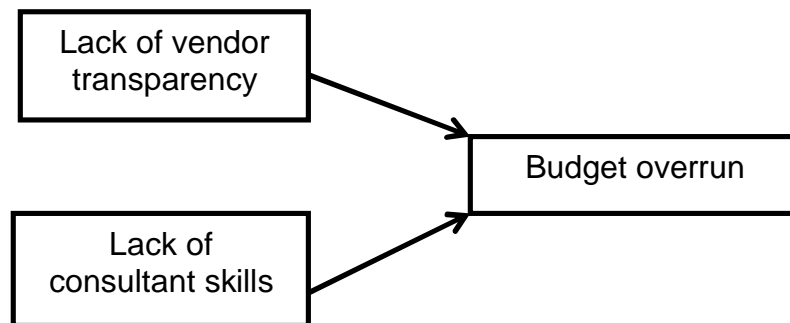


Figure 17: Budget overrun can be caused by lack of consultant skills and lack of vendor transparency

4.5.4.4 Inadequate preparation

It emerged that some SMEs did not formulate a program with a definite course of action to be followed during the ERP implementation process. The following quotes illustrate the lack of preparation within SMEs:

... *“We did not do any business case analysis”* (Respondent 10, C8).

... *“We did not really budget to be honest”* (Respondent 6, C4).

Discussion

The majority of the SMEs did not do enough planning before implementing their ERP systems. The majority did not develop a business case which forms part of the preparation process. Some SMEs did not develop a budget; some did not gather their system requirements. As a result, the SMEs were not cognisant of what to do in the event of unforeseeable risks. Sammon et al (2004) argue that the majority of problems with ERP system implementations are a result of lack of preparation.

4.5.5 Inadequate software systems design

The majority of risks fall in this category. Seven themes emerged in this category. These are: lack of information traceability and visibility; incorrect system setup; inadequate hardware infrastructure; lack of system security; unclear or misunderstood organisational requirements; lack of functionality fit in a module and the risk of having multiple systems.

4.5.5.1 Lack of information traceability and visibility

Traceability is defined as the ability to display information or history of every step of a process from its origin to the end. Lack of information traceability and visibility was common in companies which engage in repairing and servicing work and manufacturing. The risk was evident in four cases.

... “Our problem at the moment is, if I ask how far with the repair of a particular gear box (referring to a gear box from client brought for repairs)? It’s very difficult for him (referring to the clerk who monitors the repairs) to tell me what is going on. He must go to all his files and must do a few phone calls to check with the workshop guys. If the system had full traceability, he would get into the system and tell me, ok it’s on retreatment, we sent it out, here is the delivery note or they are busy grinding the machine because he would look into the system” (Respondent 7, C5).

Another participant from C8 who was explaining the challenges they were facing with their ERP system said:

... “For example, we want information for a particular part or component to be attached to its original refrigerator. We want to keep that hierarchy of information you see. When was the refrigerator bought, when was it repaired, which parts were serviced, which ones were replaced and be in a position to have a life history of all those components. So far, traceability of information has proved to be difficult. Since we implemented the system up to now we are still battling with the module” (Respondent 10, C8).

Discussion

The ERP systems failed to provide SMEs with real time materials tracking; transparency of related processes; comprehensive record-keeping and fully automated traceability of organisational products, workflow tracking and alerts. Also, ERP systems failed to provide managers with structured information to support decision making: ... *“As I said the bill of materials does not work, if I want to build a gearbox, I just want to go to the bill of materials in the system and it must immediately tell me which spares are in stock, which ones are not available with all their lead times, when to order, how long should I wait so that I will tell the customer how long do I need to make it. When I want to go to the option for repair and I just want to pull the bill of materials and say these parts are broken, make them”* (Respondent 7, C5).

The systems could not provide up-to-date information relevant for planning and production changes; parts available in stock and out of stock; lead and delivery times of spare parts and availability of material resources. However, lack of information traceability was common in companies involved in the servicing and repairing of equipment. Companies involved more in distribution and stock management enjoyed information traceability offered by ERP systems. This was reflected by the ability of an ERP system to offer better information visibility and real time business intelligence.

The findings of this study are consistent with what is in the literature. In a study carried out by Singh et al., (2010) managers failed to retrieve relevant information from an ERP system. Iskanius et al., (2009) found similar results. The flow of information within an ERP system can be hindered by factors such as disparate systems, lack of standardisation and poor technological infrastructure.

Singh et al., (2010) argue that information flow within an organisation has become a significant factor in defining an organisation's survival. Getting access to the right information at the right time is particularly important for SMEs operating in volatile and unpredictable business environments. The information is used to make decisions and manage resources (Esteves and Pastor, 1999; Mantakas and Doukas, 2011).

Hawking et al. (2007) argues that the sole purpose of implementing an ERP system is to have information to use for decision making.

Rizzi and Zamboni (1999) argue that the most effective way to achieve traceability is through implementing an ERP system. Ideally, an ERP system promotes data integration between modules; data storing and retrieval, process management and analysis which in turn makes information visibility and traceability easy. However, despite SMEs implementing ERP systems, it was evident that some SMEs were still struggling to verify the history of their products and processes in the system.

4.5.5.2 Incorrect system setup

This theme describes the inflexible nature of ERP configuration settings. The problem was evident in the majority of cases investigated and was mentioned eleven times during the interview sessions. The following quote shows how the risk was realised:

... “We had a lot of reference settings in the system which were incorrect! Until today we battle to have them all fixed” (Respondent 7, C5).

Discussion

The study found that once an organisation configures its ERP system settings or parameters in a particular way, it has to live with some of those settings. The fact that the settings were configured wrongly the first time and could not be easily re-configured when the need arose reflects the rigid nature of ERP system settings. For example, two participants indicated that: *... “Some initial choices (referring to system settings) you can’t change. There were some that were made that we couldn’t change and they were unsuitable for us”* (Respondent 1, C1).

... “You have to think very carefully when you set up the system. Changing afterwards is very difficult!” (Respondent 7, C5). The problem cannot be rectified easily.

Another participant emphasised that it is important for the ERP implementers to decide on how they want the system to be configured before the system is

implemented. They should make decisions knowing this because of the integrated nature of an ERP system; the configurations in one module affect transactions which occur in other modules. As described by the participant ... *“All the General Ledger (GL) accounts were not linked to certain transactions* (Respondent 7, C5).

... *“I think the initial settings of the system are extremely important. The consultants must take care of how they set up the system. For instance, if you say you work on a first-in-first-out stock system. That has a major effect on your future and how you process other transactions. You need to have that setup done correct from the beginning”* (Respondent 7, C5).

The inability to reverse the initial system settings is deemed to impact the company financially while at the same time straining the business relationship between the consultant company and its client. C1 completed a re-implementation and managed to solve the problem while C5 did not do a re-implementation. Instead, in an attempt to solve the problem, responsibility was passed from one consulting company to another. At the time of conducting the interview they were on their third consulting company in a space of 5 years. ERP systems are a long-term investment. SMEs should ask themselves whether the application can be modified in future. They need to know whether it can scale to accommodate evolving needs.

A flexible system grows with the company, accommodating new specifications as they emerge (Kaufman, 2007). ERP vendors advocate the use of global templates which incorporate standardized definitions and structures; master data and business processes. These are increasingly being adopted to improve standardization (Hawking et al, 2007) However, these global templates cause a lack of flexibility at the local level and they do not take into account issues such as cultural differences (Liang et al., 2004). Due to the use of default system configurations and inefficient Enterprise System (ES) configurations, companies end up having process deficiencies in the systems they implement (Shang and Seddon, 2007). These process deficiencies have been referred to as the lack of functionality fit in module in this study. Generally, SMEs lack in-house skills to configure the ERP systems which impacts on this risk (Hustad and Olsen, 2011). Implementing an ERP system

requires the alignment of software configurations and business processes. It also involves business process reengineering to include best practices followed the world over (Holland and Light, 2001).

It was also evident in this study that the lack of functionality fit in module can be caused by incorrect system set up. As described by one participant ... *“The setup of the basic system was incorrect. What is the default warehouse, which parts are linked to a particular machine; all these were not even linked. ... You know, if you receive goods, certain GL accounts need to be activated. In all cases they did not activate GL accounts (...) the asset register module did not work well, there were so many errors. The way it calculated depreciation was wrong. It had all to do with how we set it up in the system (...) I am talking about basic things, dual integration codes, General ledger codes, VAT coding and all sort of things because if that’s not set up correctly you might find that one customer out of 100 does not pay VAT.”* (Respondent 7, C5). Due to incorrect system setup, the accounts module was not fully functional.

Other specific challenges faced as a result of incorrect system setup included the inability to reconcile foreign currency accounts; the inability to calculate depreciation correctly and the inability to link the necessary accounts to General Leader (GL) accounts. As described by the participants: ... *“We could not reconcile some foreign currency accounts in the foreign currencies because they were setup as multi-currencies and not as foreign currency. I think the default setting was initially to take six decimal places, but then it ended up not working for us because it had consequences down the line. So that needed to be changed and there were other issues, I mean, I can’t remember now because it’s two years ago. Basically we had to have a total re-implementation”* (Respondent 1, C1).

Figure 18 illustrates that ERP re-implementation is also caused by incorrect system settings and lack of functionality fit in module

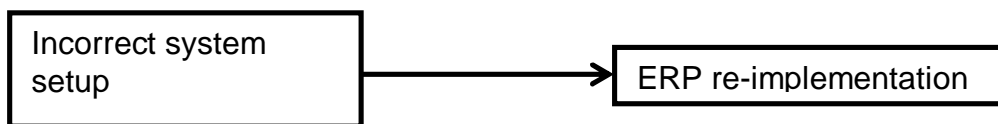


Figure 18: ERP re-implementation can be caused by incorrect system settings

Failure to link the necessary accounts means that they may not be updated whenever there is an associated transaction. Ultimately, this may lead to a lack of full system integration and other associated risks such as lack of information traceability and visibility. Figure 18 show that incorrect system setup results in deficiencies in information traceability and visibility.

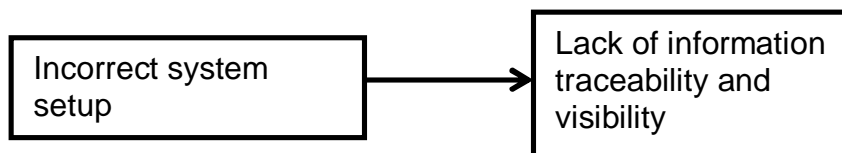


Figure 19: Incorrect systems setup can result in deficiencies in information visibility

The problem of incorrect system setup was caused by the lack of knowledgeable consultants. In all the cases, there is an agreement that the consultants did not have enough expertise and configurations were not done incorrectly. As described by the participants ... *“It (referring to the ERP system) wasn’t setup correctly by the Alpha consultants so after the first year we had to have a total reinstall changing some basic parameters”* (Respondent 1, C1).

... *“The initial software could not take 3 spaces inside numbers and all over the world all part numbers have certain spaces on certain places inside the part number and now we are busy with that conversion because the latest software can now do it. I think it had more to do with the consultants who did not know how to do it than the software because there is no reason why it could not be done from the beginning but to change them, it was a major, major, major exercise”* (emphasising) (Respondent 7, C5).

Also, as stated in the above quote, trying to correct settings configured wrongly is a demanding exercise in terms of the time consumed and the amount of work to be done. When Respondent 7 was asked whether Alpha consultants are able to help them solve some of current problems to do with the initial system configurations, he responded that: ...*“They can but it will cost us money”* (Respondent 7, C5). If the system has been configured wrongly it means more money will be required to make corrections. Figure 20 illustrates how incorrect system setups are influenced by a lack of consultant skills.



Figure 20: Lack of consultant skills can result in incorrect system setup

4.5.5.3 Inadequate hardware infrastructure

This theme describes how SMEs underestimated the hardware requirements for the new ERP system. The risk was evident in four companies. The conversational density was relatively high. The following comments passed by some of the respondents describe how this occurred:

“Initially, the system was very slow until we bought a new server” (Respondent 10, C8).

... “We had to purchase a new server in 2006. Even now we had to buy another one end of last year. Although the IT infrastructure was fine when we started, it became just too big now. There are too many users using it, there are too many files on it, and we had to buy a new server because we experienced delays in authorisations. ...It was very slow. The processor was about 80 to 100 percent all the time” (Respondent 2, C2).

Discussion

Due to the low capacity of hardware infrastructure, it frequently failed to support the ERP system resulting in a slowing down of business operations. As a result of the

inadequacy of the hardware infrastructure initially bought by some of the SMEs, more suitable hardware had to be purchased, which used unbudgeted funds. Al-Mashari, (2002) and Jarrar et al. (2000) reported that adequate IT infrastructure, hardware and networking are important factors for a successful ERP implementation.

4.5.5.4 Lack of system security

A few companies cited security as a concern after adopting an ERP system. The risk was mentioned twice in the interview sessions. The participants made the following comments regarding system security: ... *“No sales man is allowed to tamper with the price or change the price without the knowledge of the manager but that was happening. Discounts were given without the knowledge of the manager until at a later stage after people started understanding how the system operates”* (Respondent 9, C7).

“With Beta you had to trust the person in the office because anybody could do anything. ...The new culture is if the system allows it then I can do it. ...With the old system people had to always come for authorisation. If people find a gap in the new system, they will use it” (Respondent 2, C2).

Discussion

The majority of the respondents were satisfied with the security of their data in a centralised system. The concern from the minority was that the sharing of data across multiple departments exposed their confidential information and it resulted in the manipulation of the data. Sales discounts were given to customers without the knowledge of the responsible manager. Consequently, this resulted in the company losing some money.

Implementing an ERP system creates data security risks and lack of user controls in the ERP system (Ojala et al., 2006; Sumner, 2000). In this study, the problem of system security was caused by how the system was initially setup. One participant was asked how they rectified the problem and gave the following response. ... *“We asked IT guys (referring to the consultants) to come back and setup the security system correctly (...) It’s now a thing of the past because those avenues have been*

checked and we rectified them” (Respondent 9, C7). This response implies that incorrect system setup results in lack of proper system security. Figure 21 illustrates that lack of proper system setup may result in lack of system security.

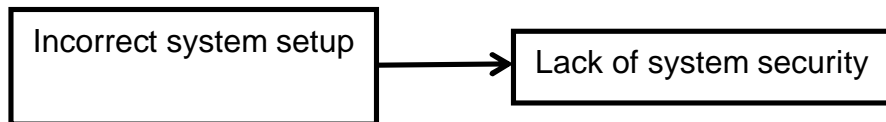


Figure 21: Incorrect system setup can result in lack of proper system security

4.5.5.5 Unclear/Misunderstood organisational requirements

Some of the organisations failed to define their organisational requirements clearly prior to ERP implementation. Thus ERP vendors and implementation consultants failed to understand the SMEs organisational requirements. The problem was distinctly visible. It was evident in five of the cases investigated and it had a relatively high conversational density, as exemplified by the following statements:

“There was a sales guy and a technical guy (...) who demonstrated it (referring to an ERP system) to us and we were trying various options; what about this; can you do this for us, can you do that” (Respondent 4, C3).

... “Again, when it comes to do bespoke work, make sure that the right people are on the job. They need to understand the system as well as business because the initial accounts module which was written was not 100 percent what it should have been. So about 7 months after implementation I went and had that module re-written and we only realised that benefit 8 or 9 months down the line” (Respondent 6, C4).

“There could have been a lack of understanding of our organisational requirements, so the scope which was given to these people, the service providers, was wrong. So they responded to the scope which was given to them. When they realised the scope was wrong, it was too late” (Respondent 8, C6).

Discussion

It was found that there was a lack of clarity on what the SMEs wanted and in some instances the scope of organisational requirements was defined wrongly hence the consultants could not comprehend the organisational requirements well. Comments from Respondent 4, Respondent 6 and Respondent 8 show that there were no clearly defined organisational requirements prior to working with the consultants.

A comment from Respondent 4 shows that there was not enough preparation and SMEs ended up doing trial and error on what the system could and couldn't do. Instead of checking what the system could do against their system or organisational requirements, they were asking the consultant what the system could offer. Thus ERP vendors were allowed to take the lead. If vendors are allowed to take the lead in the absence of someone who is fully aware of the organisational requirements and how an ERP system operates (internal expert), the result is likely to be inadequate communication and a lack of transparency. Vendors capitalise on the lack of internal experts such as business analysts and start giving their sales speech which ultimately results in a lack of transparency and miscommunication. This was evident in a quote extracted from one interview: ... *"When vendors start doing a sales speech and if you do not have someone there who understand the basics of systems; and what can be done and what cannot be done and someone who understands what the business requirements are, you normally end up with miscommunication"* (Respondent 6, C4).

A comment from Respondent 6 shows that the initial requirements for the accounts module for C4 were not defined correctly and the module had to be re-written correctly. Also, the initial person who did the job was not the right person and lacked an understanding both of how the system operates and the business side. As a result of this lack of skills, the person defined the organisational requirements wrongly.

The problem of configuring a system incorrectly was caused by the failure to define organisational requirements clearly. As described by one participant: ... *"They are blaming us for having the setup done wrongly but it was them who did the set up and the whole implementation. ... Initially, when the module was setup, the consultants did not know exactly what we wanted so the set up was initially wrong. The*

consultants just botched that (referring to the Finance Module) module and it failed to deliver” (Respondent 10, C8). The obscurity in organisational requirements compounded the situation and the end result was that the system was set up wrongly. Vilpola, (2008, p. 107) stated that “*the major problem is that SMEs lack expertise in requirement specifications and are thus often at the mercy of the ERP vendors*”. The findings of this study confirmed this.

Figure 22 shows that insufficient internal expertise can result in inadequate communication; inadequate preparation; unclear or misunderstood organisational requirements and can expose a company to a lack of vendor transparency. Inadequate preparation can result in inadequate communication and unclear or misunderstood organisational requirements. In turn, inadequate communication can result in unclear or misunderstood organisational requirements.

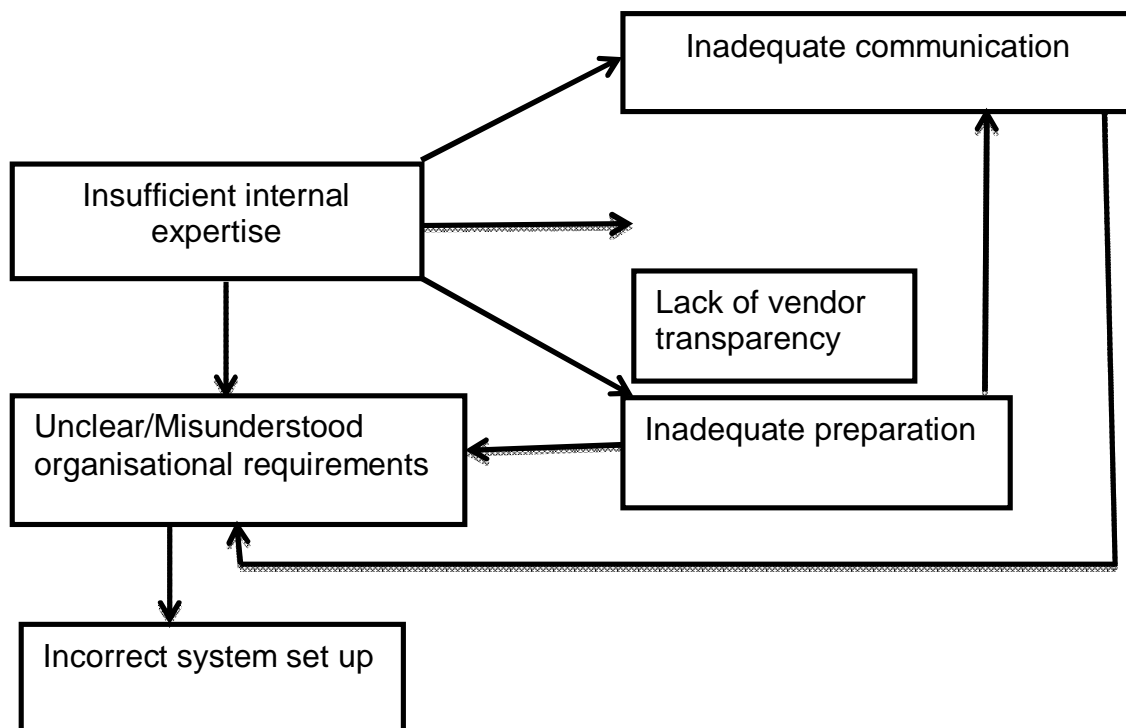


Figure 22: Lack of internal expertise can result in lack of vendor transparency; inadequate communication; unclear or misunderstood organisational requirements and inadequate preparation. Inadequate preparation can result in in unclear or misunderstood organisation

4.5.5.6 Lack of functionality fit in module

The problem of lack of functionality fit in module was prevalent in this study. It was evident in all the cases investigated and it had the highest conversation density. It was mentioned 32 times in all the interview sessions. At least one module did not work properly for all the companies. The following comments from different participants describe how this problem was realised.

“In terms of disadvantages, one of the biggest ones was probably the Material Requirements Planning (MRP) module. Just because we have so many product lines, (...) we sale 20 000 products and we have about 8 000 stock lines in our warehouse. When you try to run the MRP module at an individual level it does not work, there are too many codes so we actually bought the module and got credit for it to be honest” (Respondent 4, C3).

“... The system does not have multicurrency ledger dimension. You can set many currencies in Beta but you have to choose one reporting currency” (Respondent 10, C8).

.. “We used the Alpha CRM module for 6 months and we stopped. We used Microsoft Excel for 2 years and we went back to the CRM module but we used only the basics, we then started using TATA (Pseudonym for third party software)” (Respondent 2, C2).

Discussion

Many of the ERP solutions which appear to be full-function solutions are not. According to the findings of this study, at least one of the modules failed to provide the required functionality prompting for SMEs to run other systems parallel to the ERP system. Therefore, SMEs who want to implement an ERP system should first check whether an ERP system is a “full-function” ERP solution or is a less capable solution. The majority of ERP vendors have integrated what they call “best practices” and they want customers to use them. These best practices are from the vendor’s perspective and they may not necessarily be true for all companies. One respondent

stated: *“The other thing that changed again is, when you implement Alpha, they tell you its best business practice. Best business practice does not always mean it has got all what you want”* (Respondent 2, C2).

Taking one example from the cases investigated, a universally developed module could not work for C2. The respondent commented that: ... *“The job card module or service centre module of Alpha is also elementary - it’s not advanced, it has limitations in the sense that it can only do one item per job card so the problem comes if Telkom sends me 600 headsets at one goal to service, it means I have to open 600 job cards”* (Respondent 2, C2). So the notion of “one size” fits all does not apply universally. Each company has industry specific requirements. One of the participants commented that: ... *“Every industry has a level of uniqueness to it. You always have a requirement to do some customisation or have a module written up for yourself; which is specific for your needs”* (Respondent 6, C4). However, companies in the process industry have varied IT requirements while those in the manufacturing industry have more uniform IT requirements (Sandberg and Holmström, 2008).

In the literature the problem of lack of functionality fit in module has been referred to as “drifting”. According to Ciborra et al. (2000) drifting refers to a situation where an organisation which does not have alternatives gets into unforeseen circumstances which reflect a lack of full function solution of an intended technological design.

As described by one of the participants ... *“For accounting I use Alpha, for CRM (Customer Relationship Management) I use Sales Force. It’s a good system but very expensive”* (Respondent 2, C2). The different modules/systems were sold, developed and supported by different vendors. This was expensive for the SMEs. As described by one participant ... *“We now headed for a more developed web portal front end built internally compared to what we considered initially. That was another R250 000; just to build the web portal front end”* (Respondent 4, C2). Also, the SMEs had to manage multiple vendors despite the challenges they faced in dealing with vendors as explained earlier. The independent modules were mapped or bridged via interfaces and this was also expensive for the SMEs. The architectures had to be compatible to allow for integration.

The extent to which an ERP system matches business requirements is a critical implementation success factor (Hong and Kim 2001). Sandberg and Holmström (2008) argue that once full integration is achieved, it leads to the elimination of data redundancy and improved data quality. However, a lack of functionality fit in module results in a lack of full integration. This implies that all other associated benefits such as information traceability and visibility are compromised. Previous studies by Iskanius (2009); Iskanius et al. (2009) and Ojala et al. (2006) have reported on poor task-technology fit and the inability of the ERP system to provide full functionality.

In some SMEs, the mapping of business processes posed challenges on the functionality of the certain modules. In this study, one participant said: ... *“The first guy did a lot of setup errors. We mapped all the processes and we told them (referring to ERP consultants) exactly what we wanted but we just battled to get going”* (Respondent 7, C5). C5 struggled with the functionality of the ERP system despite having stated what they wanted and having mapped all the processes. The consultants blamed the management of C5 for giving them the wrong organisational requirements. As a result, there was a misunderstanding. There was a high possibility that the requirements were not clear or they were misunderstood. Thus the end result was an incorrect system setup and a lack of functionality fit in module.

Respondent 7 said: ... *“They (ERP consultants) said but you said this and that (referring to the specified organisational requirements). So I said its fine, I do not work like this. I said it but fix it for me. ... It was extremely expensive...”* (Respondent 7, C5). Respondent 7 admitted that they specified the requirements wrongly. However, they expected the ERP consultants to solve their problems even if they had not met their obligation to specify their requirements clearly.

Also, it emerged that if the issue of defining business requirements is not handled cautiously, it can lead to misunderstandings and finger pointing and subsequently loss of money. As the conversation proceeded, the ERP project manager acknowledged that his company had made a mistake in stating their requirements. However, it was expensive to solve consequential problems hence a

misunderstanding arose. Iskanius (2009) stated that the vendors may fail to understand customer needs.

Incorrect system set up and unclear or misunderstood organisational requirements result in a lack of functionality fit in module which subsequently leads to ERP re-implementation. In C1, the financial module was set up incorrectly and as a result the accounting module failed to deliver. This led to the re-implementation of the system. Relationships in this theme are shown in Figure 23.

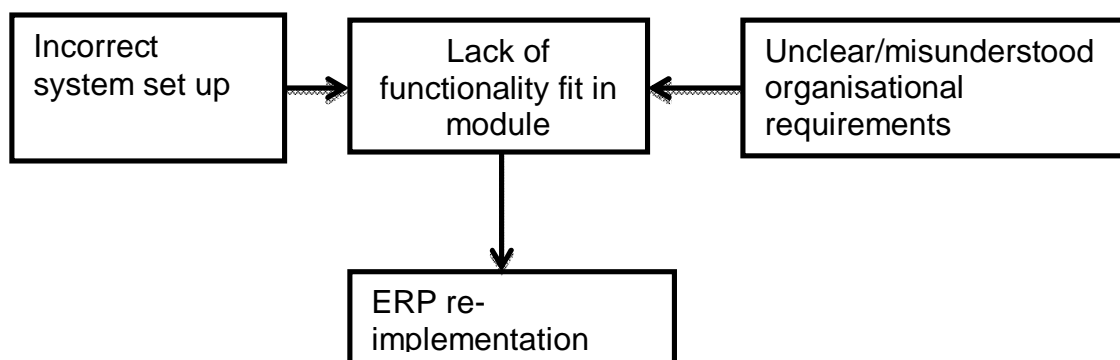


Figure 23: Lack of functionality fit in module can be as a result of incorrect system set up and unclear or misunderstood organisational requirements

4.5.5.7 Multiple systems

As explained earlier, none of the investigated companies found that all functionality could be found in one system. As a result, some resorted to the implementation of third party systems which run parallel to an ERP system. As described by some of the participants:

“We have Beta as an accounting system but our service center runs on TERP. TERP is a small retail accounting package but it has a nice job card function so we have two systems separate from each other which does not work because we cannot consolidate the information” (Respondent 10, C8).

Discussion

One participant who was asked which ERP system they used said: ... *“For what? I use a lot of systems. For accounting I use Alpha, for CRM I use Sales Force (...) It’s a good system but very expensive (...) Now we are going to move to Microsoft Dynamics. We are planning to move in the next quota coming now. That’s going to integrate with Alpha. It will be a full integration”* (Respondent 2, C2). The disparate systems were from different ERP vendors hence communication between them was a challenge. In some instances, SMEs improvised ways of having the systems communicate with each other but these were inefficient, expensive models. Due to infrastructure incompatibility, the systems could not interface with each other. With no ability to make the systems communicate with each other, the SMEs resorted to entering data in multiple systems. Information was spread across various systems, housed in different functional units. Although each of these functional units could competently support a specific business activity, enterprise-wide performance was deterred by the lack of integration. Furthermore, the maintenance of these disparate systems resulted in additional costs. Some failed to communicate seamlessly hence they could not gain access to visibility of orders, control their stock and make decisions based on up-to-date order changes. These were critical factors which affected their daily operations. Iskanius, (2006), wrote about the lack of integration as an issue with ERP systems. In a study done by Iskanius, et al., (2009), it was discovered that using the same information and the same database in different IT systems could not successfully be done. The data analysis has revealed that it is difficult to get rid of third party software or internally developed software thus defying the aims of ERP systems. Dixit and Prakash (2011) and Singh et al., (2010) argue that parallel use and simultaneous maintenance of two or more systems defies the purpose of having an ERP system in place.

The risk of having multiple systems is caused by a lot of other risks. Poor data migration may result in the use of multiple systems and this also results in lack of information traceability. This is evident in the following quotes: *“As for the part numbers, all the information was not there, (...) the conversion was not as clean as we thought. We had the Omega system running for quite some time so that we could get into the history when we needed it”* (Respondent 7, C5).

“All historical data we lost because we could not bring it over. I think if we were on a Windows based system that could have saved us but we lost. It was a risk. So what we had to do there was although Beta was no longer in use we still run it parallel with Alpha especially in accounts, we still look for information. (...) the knowledge of the installers was not that good (...) we had to keep the old system live until all the invoices were paid by the customer so that we did not have to worry about them again” (Respondent 2, C2).

Another risk causing multiple systems is that of lack of functionality fit in module results multiple systems. As stated by one participant: ... *For accounting I use Alpha, for CRM I use Sales Force*” (Respondent 2, C2). Some of the causes are not direct but they occur as a result of the interdependency of the risks. The data analysis revealed that having multiple systems within one company may result in a lack of information traceability, visibility and a lack of full integration.

Unclear or misunderstood organisational requirements can result in a lack of functionality fit in module which subsequently results in having multiple systems within one company. The relationships which emerged in this theme are shown in Figure 24.

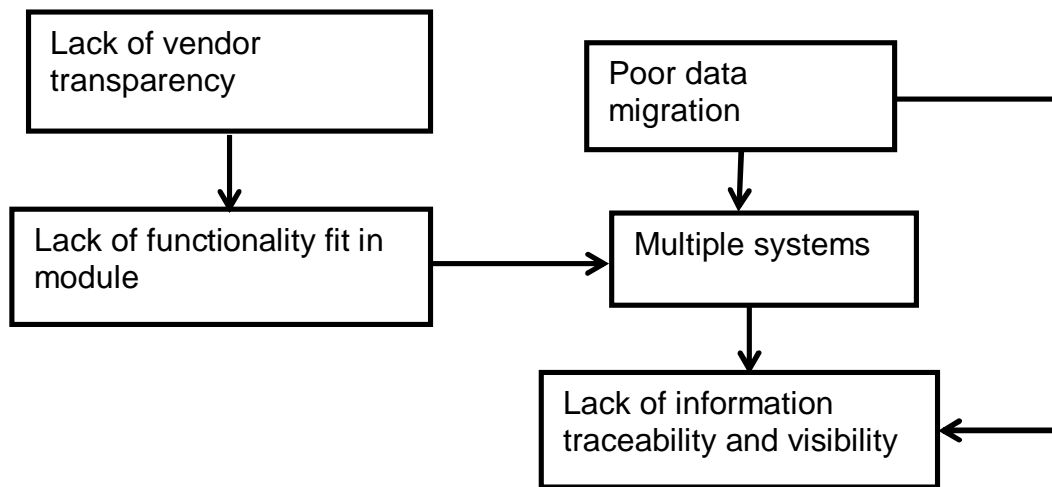


Figure 24: Lack of vendor transparency and unclear or misunderstood organisational requirements can result in lack of functionality fit in module which in turn results in having multiple systems. Poor data migration also results in having multiple systems. The use of multiple systems can result in lack of proper information traceability and visibility

4.5.6 Discussion: Risk interdependence framework

One of the objectives of this study was to investigate how ERP risks cause the realisation of other risks. The findings indicate that they do indeed depend on each other. The interdependency diagrams which emerged from the risk themes have been integrated into a final framework referred to in this study as the Risk Interdependence Framework. The framework is shown in Figure 25

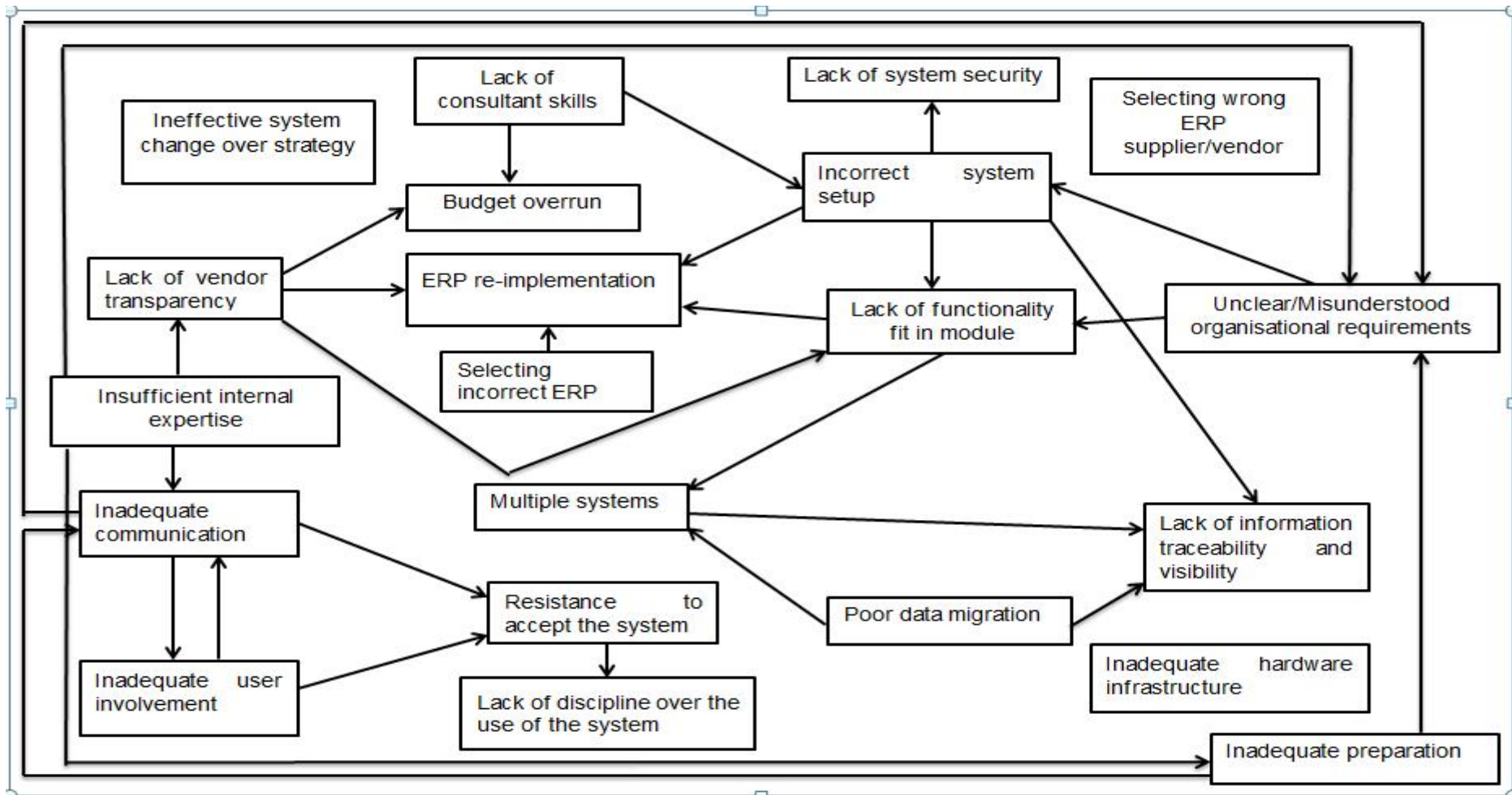


Figure 25: The interdependency of ERP risks

Figure 25 shows the interdependency of ERP risks. It is an explanatory model which summaries how risks influence each other in the realisation process. The risks of adopting an ERP system do not exist in isolation. The model shows the causal relationships which exist between risks and the root causes of these risks. The following 2 sections look at causal risks and resultant risks which emerged from the study.

4.5.6.1 Causal risks: Most influencing

A causal risk is one which causes the realisation of another risk. It's a situation where the second risk is understood to be a consequence of the first risk. In Figure 25 a causal risk points towards other risks indicating that it is the influencer of the other risk. For example, incorrect system setup influences the lack of system security; the lack of functionality fit in module; ERP re-implementation and the lack of information traceability and visibility. Therefore, incorrect system setup is the major casual risk. Other causal risks which emerged from the study are as follows: insufficient internal expertise; inadequate preparation; inadequate communication; lack of consultant skills; lack of vendor transparency; and unclear or misunderstood changing requirements. These each had a minimum of 5 risks which depend on them.

Insufficient internal expertise; lack of consultant skills; poor data migration; ineffective system change-over strategy; inadequate hardware infrastructure; selecting the wrong ERP supplier and selecting the incorrect ERP system are independent risks. They are not a result of the manifestation of other risks. Presumably, these risks can be dealt with easily.

4.5.6.2 Resultant risks

A resultant risk is one which is the final consequence or outcome in the risk realisation process. For example, insufficient internal expertise influences inadequate communication. In turn, inadequate communication leads to inadequate user involvement. Inadequate user involvement stimulates lack of discipline over the use of the system as the final consequence. Therefore, lack of discipline over the use of the system is the resultant risk. Dominant resultant risks which emerged from the

study, are as follows: lack of information traceability and visibility; ERP re-implementation; lack of functionality fit in module; use of multiple systems; inadequate user involvement and lack of discipline over the use of the system. These were the risks with the largest number of other risks influencing their realisation whether directly or indirectly. These had a minimum of 5 risks which directly or indirectly influence their realisation.

The researcher perceived these resultant risks to be difficult to eliminate since they are a result of underlying, causal risks. Thus they cannot be easily eliminated during or after ERP implementation.

4.6.3 Resultant ranking of the risks from the study

The risks which emerged from the study were ranked according to the following 4 perspectives.

- (i) The risks which dominated by being evident in the majority of the cases investigated.
- (ii) The risks which dominated by being mentioned most frequently during the interview sessions (high conversational density).
- (iii) The risks which dominated by having the majority of other risks influencing their realisation (resultant risks).
- (iv) The risks which dominated by influencing most the realisation of other risks (causality risks).

Risks that are difficult to deal with because they emanate from other risks are marked in light brown and those that marked in light green are independent and can be easily dealt with as they are not a manifestation of multiple risks. Table 14 shows the resultant ranking of the ERP risks.

Table 14: Resultant ranking of ERP the risks

Position	Risk	Number of cases where the risk was evident	Frequency of the conversational density	Number of risks which depend on the risk (causality risks)	Number of risks which influences the realisation of the risk (influencing risks)
1	Lack of functionality fit in module	8	32	3	7
2	Insufficient internal expertise	6	14	12	-
3	Lack of consultant skills	6	12	6	-
4	Incorrect system setup	5	11	4	3
5	Poor data migration	5	10	2	-
6	Resistance to accept new system	5	10	1	3
7	Unclear/Misunderstood changing requirements	6	7	5	4
8	Inadequate preparation	5	7	11	-
9	ERP re-implementation	4	6	1	8
10	Lack of vendor transparency	4	5	5	-
11	Ineffective system change over strategy	3	9	-	-
12	Inadequate user involvement	3	8	3	6
13	Inadequate hardware infrastructure	4	7		-
14	Multiple systems	3	6	1	7
15	Lack of information traceability and visibility	4	4	-	11
16	Selecting wrong ERP supplier	3	5	-	-
17	Inadequate communication	3	4	11	3
18	Budget overrun	2	4	-	3
19	Lack of discipline over the use of the system	3	3	-	5
20	Lack of system security	2	2	-	3
21	Selecting incorrect ERP system	1	2	1	-

Key

Lack of functionality fit in module	The risk has a minimum of 3 other risks which directly and indirectly influences its realisation.
Insufficient internal expertise	The risk is an independent risk, it has no other risks which influence its realisation

4.6 Cost Elements

In this context the word cost elements refers to the cost of hardware, software and implementation services. This section focuses on the cost elements for SMEs implementing an ERP system. The emphasis is not on specific cost figures of the hardware and software which SMEs bought but it is on identifying specific elements against which SMEs incurred costs when they implement an ERP system. The cost of actual hardware, implementation services and software which the companies incur varied from country to country and from company to company depending on factors such as company size. The aim was to come up with a model which SME organisations can use for estimation of their costs when developing a business case for adopting an ERP system. However, the model can also be used by ERP vendors and consultants when they draw up their budgets and when they give advice to SME organisations. Table 14 summarises the cost elements and gives organisations a model which they can use to estimate their costs.

Usually, SMEs are resource constrained hence any cost increase may have adverse effects on their survival. Thus, SMEs are more cost sensitive when compared to large enterprises (Haddara, 2011). Irani and Ghoneim, (2002) argue that there is a gap to be filled on cost factor identification. As stated earlier, ERP implementation projects suffer from being unable to identify and estimate costs due to a poor understanding of cost factors (Daneva, 2004; Seddon, 2003). This problem is particularly bad for SMEs.

This study integrated potential cost elements involved in the adoption of ERP systems. The cost factors have been divided into three categories which are

hardware, software and implementation services. Table 15 gives a summary of the cost elements which emerged from the study.

Table 15: ERP Cost elements themes

Cost Elements	Cost category		Theme	
	1	Hardware Costs	1.1	Servers
			1.2	Networking
			1.3	Clients
	2	Software Costs	2.1	Database Management System
			2.2	Operating Systems (OS)
			2.3	Licences
			2.4	Storage
	3	Implementation Services Costs	3.1	Training
			3.2	Consulting
			3.3	Customisation

The following section focuses on explaining the three categories and the themes which emerged. However, none of the organisation used a formal cost estimation procedure.

4.6.1 Hardware Costs

The purchase of hardware is one of the major cost elements incurred by SMEs. One participant said: ... *"We had other additional hardware expenses of another half a million rand"* (Respondent 6, C4). The purchase of hardware formed part of the infrastructure development process. The participants were asked about the specific hardware they purchased during the ERP implementation. Three themes emerged; these are servers, client computers and networking equipment.

4.6.1.1 Servers

The participants indicated that they purchased servers which would be dedicated to running the ERP system. As described by the participants:

... *"We have a dedicated server for the system"* (Respondent 10, C8).

... *"We had to purchase a new server in 2006. Even now we had to buy another one end of last year"* (Respondent 2, C2).

The findings indicated that some SMEs bought servers with less capacity than were required to run an ERP system. This resulted in the realisation of a risk identified in the study as inadequate infrastructure. The organisations ended up spending more on servers than anticipated. As a result of the need for an increase in processing power, SMEs ended up upgrading their servers. This may also be attributed to cost overruns experienced by some SMEs. The need to purchase servers when organisations implement an ERP system was reported as a cost driver in previous studies such as those conducted by Davenport, (2000) and Love et al., (2005).

4.6.1.2 Networking

After implementing an ERP system, SMEs changed and or upgraded their network systems. As described by one participant:

... *"We changed our networking, (...) we spend a lot of money in IT and networking and we also changed other areas"* (Respondent 4, C3).

The need to have a new network or to upgrade an existing network when organisations implement an ERP system is consistent with the literature. Love et al; (2005) obtained the same findings as in this study.

4.6.1.3 Clients

The analysis revealed that SMEs purchased desktop computers and laptops for operational use as illustrated by the following comments:

"We have just upgraded our computers. Everything is running smoothly" (Respondent 3, C1).

... "We bought 70 laptops and that was 6 or 7 Grand (thousand Rands) each and it was quite a lot of money ... the moment we bought Omega we moved away from reps being desk bound and we moved them to laptops with 3G cards pretty much immediately, that was a very big investment" (Respondent 4, C3).

From this statement it is noted that some organisations purchased laptops to be used on a wireless connection. The laptops were to be used on Internet based systems. Due to the need for an increase in processing power, some SMEs upgraded their computers. This cost element has also been identified in studies done by Elragal and Haddara, (2010) and Haddara, (2011).

4.6.2. Software Costs

Four themes emerged from analysis of the results. SMEs incurred costs when they purchased Database Management Systems (DBMS); Operating Systems (OS) and when they acquired the required licences. All these are direct costs. Few studies such as those conducted by Elragal and Haddara, (2010) and Haddara, (2011) have reported that the cost of DBMS; OS, storage costs and costs for various licences are cost drivers realised during ERP system implementation.

4.6.2.1 Database Management System (DBMS)

The ERP systems were associated with different Database Management Systems (DBMS) in different SMEs. These include Oracle and Microsoft SQL. SMEs purchased the DBMS so that they would be able to manage their databases and for reporting purposes.

... "I can access data in Microsoft SQL and I can write any report I want" (Respondent 2, C2).

... "We did not go the CSM route for our database; we went on to Microsoft SQL" (Respondent 4, C3).

... "We implemented Oracle Database Management System" (Respondent 8, C6).

4.6.2.2 System (OS)

Operating Systems (OS) was one major theme that emerged. Certain SME organisations changed their operating systems completely; others upgraded their OS to the latest version at that time. Some ERP systems had minimum OS requirements. According to some of the participants:

... *“The ERP system uses Microsoft Windows”* (Respondent 2, C2).

... *“At that time Microsoft Windows 98 was the minimum requirement. We still had some computers with Microsoft Windows 95 so we had to upgrade the software and hardware”* (Respondent 7, C5).

“We moved from a Linux set up (...) we started running Microsoft Windows” (Respondent 4, C3).

“I entered in to a fixed price contract. Our competitors are on the same system as ours but it cost us R350 000 and it cost them 1.2 million Rand for the same software and implementation” (Respondent 2, C2).

4.6.2.3 Licences

The SMEs invested in the required software licences. The licences were for the ERP systems and application software and included licences for the operating system (e.g. Microsoft Windows); application software (e.g. Microsoft Office); Data base Management Software (DBMS) (e.g. Microsoft SQL Server); an ERP system and Microsoft Exchange software. This was evident in the following statements made by the participants:

... *“We have Microsoft Office on all our machines. We have licences for all our machines (...) we have 28 concurrent licences for Omega users (...) we have 60 licences for our sales team (...) we rolled out Microsoft Exchange about a year ago (...) it integrates with Omega”* (Respondent 4, C3).

... *“We are on Tapex now; it’s a good system but very expensive, the licences are expensive”* (Respondent 2, C2).

Errors in cost adoption estimation arise from the notion that licences constitute the bulky of the ERP project cost (Jones, 2007). Haddara (2012, p.3) argues stating that *“Peoplesoft, as well as SAP state that the software license purchase is not the big bulk, as customers could spend around three to seven times more money on the implementation and its complementing services than the initial software license costs”*.

The cost of an ERP implementation is determined by the type of an ERP system deployed and the number of modules to be implemented (Equey et al., 2008). An increase in the number of modules implemented results in increased total cost.

4.6.2.4 Storage

Different organisations invested money in purchasing storage facilities. This is evident in the following statements made by the participants:

...“We purchased back software and other storage facilities” (Respondent 9, C7)

..“We have spent a lot on infrastructure. We have put a much better infrastructure in and around our backups and our server” (Respondent 4, C3).

The quotes indicate that the need for storage devices and software is one of the direct costs realised by SMEs. These are in line with the findings of a study conducted by Love at al. (2005).

4.6.3. Implementation services

Three themes emerged in this category. These are training, consulting and customisation. One participant commented that: ... *“The biggest expenses are the labour; installing the system; customising and, training the people. Those are the biggest expenses”* (Respondent 4, C3). Basically, the statement encompasses all three themes. These themes were common across the cases investigated. One participant described how the incurred Implementation services costs: ... *“We had half a million and when we finished because of implementation costs it was close to a million when we stopped. It almost doubled our budget”* (Respondent 7, C5).

4.6.3.1 Training

Training is one theme which emerged from the study. SMEs incurred the cost of having their employees trained so that they would be able to use the ERP system. One participant emphasised that training is very important during ERP implementation. The participant said:

“The other thing is training. Training is very very very important” (Respondent 4, C3).

One participant from a company which incurred the cost said:

... “We paid the consultants who were training our people” (Respondent 9, C7).

In the majority of the cases, the training cost was part of the initial installation agreement. There was no separate cost to be paid for training. Various organisations incur the cost of training during ERP implementations (Davenport, 2000; Elragal and Haddara, 2010; Haddara, 2011; Hustad and Olsen, 2011; Mckie, 1998, Wu et. al. 2008; Sumner, 2000).

4.6.3.2 Consulting

The cost of consulting includes the initial installation of the system; continuous system maintenance and correction of errors. The participants described how they incurred these costs:

... “We probably spent about R400 000 on consulting, for getting the software in (...) we now use our consultant she is here on average 2 days a month, full day at a time (...) I think one of the main things is you will never really know until you have used it (referring to an ERP system) is how much constant maintenance it will cost you” (Respondent 4, C3).

“I had IT here almost 3 times a week to fix something, they fix something today it works then we get an error and tomorrow it’s not working again” (Respondent 2, C2).

“Our initial cost for implementing Omega was a million Rand or just short of a million Rand so our total cost was about 1 and half million Rand” (Respondent 6, C4).

Consulting includes the costs of data migration; costs of integrating different modules and or systems; labour costs; cost of ERP ownership; annual maintenances costs and any other forms of external consulting. Consulting is one of the major expenses realised by SMEs implementing an ERP system. The quote from Respondent 2 indicated that, after ERP implementation, SMEs had consultants coming for trouble shooting and supporting the system.

Management and staff resources costs and cost of software ownership (i.e. systems support and troubleshooting costs) are some of the indirect costs realised by organisations implementing an ERP system (Love et al. 2005). These indirect costs were also confirmed in this study. The findings are in line with the results of studies by Chen et al. (2008); Davenport (2000); Elragal and Haddara (2010); Haddara, (2011); Mckie (1998) and Wu et al. (2008). However, in some of these studies labour costs were identified as hiring and training costs hence they were discussed under those respective topics. Other indirect costs identified in literature are productivity losses and management time (Love at al. 2004). These were also confirmed in this study. As described by the participants: *“Other than time, effort and business disruptions it did not cost us extra money”* (Respondent 1, C1). The statement indicated that they lost on time, business disruptions and management efforts during an ERP re-implementation.

As explained earlier under risks section 4.5.4.3, lack of consultant skills was a major cost driver among SMEs. Consultants did not have enough skills hence SMEs ended up spending more than they estimated resulting in budget overrun.

The cost of an ERP project is determined by the level of management involvement; experience consultant's and employee's involvement (Equey et al., 2008). In addition, the findings of this study indicated that the level of consultant skills also influence the cost of the project. Equey et al., (2008, p. 5) stated that *“it is interesting to note that even if the cost of an experienced consultant is high; his experience will probably*

decrease the duration of ERP implementation and subsequently the total cost of the project. The involvement of employees in the ERP project increases the cost, but this involvement may probably be considered as a way to facilitate the adoption of a new system”.

4.6.3.3 Customisation

Due to differing organisational requirements, SMEs had to customise the ERP system to suit their specific needs. The process is on-going because needs change. SMEs have to be aware that sometimes customisation can go beyond the scope of what had been agreed initially. Consequently, that will cost organisations money. In the following statements, the participants shared how they incurred additional customisation costs:

“Once you start billing a report, the scope of work said you get 10 reports of this, 5 reports of that, when you circulate to managers, they say, it’s nice but can you change this, can you add this, can you add that and that cost you extra. That exercises never stop, its on-going” (Respondent 2, C2).

“We knew exactly where the business was not mature enough to handle the sort of functionality that the system can offer so when we needed more functionality, we had the developments of the bespoke systems” (Respondent 6, C4).

The findings of this study indicated that customization and additional functionality requirements were some of the major cost drivers. The ERP vendors and consultants did not inform SMEs upfront that the system need to be customised and it is also a continuous process. As described by one participant: ... *they (ERP vendors and consultants) do not tell you that you must customise every single form for your company”* (Respondent 7, C5). The cost rise in customisation was as a result of lack of vendor transparency. Also, as indicated by Respondent 2 above, reporting became a continuous exercise among SMEs and this was not expected. As a result, the cost of the project escalated than anticipated.

Researchers such as Elragal and Haddara, (2010), Haddara, (2011) and Wu et al. (2008) identified customisation as a cost driver during ERP implementation.

4.7 ERP system business case development practice in SMEs

Although the majority of the ERP implementations were described as successful, many of the SMEs did not develop a formal business case prior to ERP implementation. For example, as expressed by some participants: ... *"We did not do any business case analysis"* (Respondent 10, C8).

... *"We did not put anything in writing; we did not document the reasons why we changed our system and our expectations from the new system"* (Respondent 9, C7).

... *"There was no written business case document"* (Respondent 4, C3).

None of the SMEs could present a business case document which explicitly listed the benefits were they expected to get from an ERP system; the potential risks they expected to face and the costs they anticipated incurring during the implementation process. Two out of eight of the cases investigated did a business case analysis. However, C3 claimed that the business case analysis was not comprehensive. The company did only a basic analysis of the anticipated costs, benefits and risks. As expressed by the participant for C3: ... *"It was a pretty simple basic document laying out benefits, the usual advantages, disadvantages and the costs (...) I documented really why we had to move from the old system (...) I did in an email format and it was very basic stuff"* (Respondent 4, C3). However, Respondent 4 (participant for C3) was hesitant to share the email with the researcher. Respondent 1 (participant for C1) acknowledged that they did a business case analysis but it was not documented. The participant for C1 had nothing to show as evidence that a business case analysis had been done prior to the adoption of an ERP system.

Despite the failure of all the SMEs to present a fully developed business case document to the researcher, the majority of them were able to state their main objective (referred to in this study as the design objective) for implementing an ERP system. All had a general expectation of what the ERP system was going to offer

despite failing to document such expectations. They were fully aware of their problems and why an ERP system was a potential solution to their challenges. As reported by some of the participants: ...*"The main thing was to be able to integrate with distributors"* (Respondent 1, C1).

... *"So we were running a package which down the line did not integrate, it did not have the modules we needed and essentially it was not running. It was as poor as Pastel if I may say that. It was very basic (...) it was a matter of where do we move to as opposed to could we move, we had to move, we had no choice"* (Respondent 4, C3).

Failure to produce a comprehensive business case document as evidence that a business case analysis was done prior to ERP adoption was common across all the SMEs investigated. Although the majority of the SMEs could state the benefits they were expecting to get from an ERP system (as shown in Table 9), there is enough evidence from the study that the majority of the SMEs never considered the worst case when they adopted an ERP system (as shown in Table 12). They could not state upfront many risks they expected to realise prior to implement an ERP system. Instead, the majority managed to state the risks they realised rather than those they anticipated. This explains why more risks than benefits were realised in this study. The SMEs could not do any form of mitigation against potential risks.

It was noted in this study that the failure to develop a comprehensive business case was a prevailing phenomenon. One of the reasons which emerged to explain this was a lack of resources such as manpower and time among the SMEs. All the cases investigated were privately owned businesses with the Chief Executive Officer (CEO) or the Managing Director (MD) as the overseer of the company. As a result, it was difficult to divert attention from core business activities to develop a business case. They were always deeply engrossed in day to day activities hence time to do a business case analysis was not always available. Some participants who were questioned as to why they did not do a business case analysis prior to ERP implementation had this to say: ... *"We are always busy and time to document such things (referring to a business case document) is not always available"* (Respondent

10, C8). ... *“Senior management are very involved in the business (...) sometimes it’s not easy to divert attention”* (Respondent 9, C7). Also, assigning additional manpower to focus on coming up with a business case was not possible since the CEO or the MD were the only people who were fully aware of what was happening in each company. This was compounded by high power distance and a big gap in education levels between managers and subordinates within SMEs. This point was explained in detail in section 4.7.

It is generally known that SMEs suffer from lack of resources (Levy and Powell, 2000; Thong, 2001). Although, the lack of resources did not emerge as one of the risks in this study, it’s worth mentioning it as a factor which contributed to the lack of business case development within SMEs.

Reasons which explain why SMEs did not do a business case analysis include: inadequate preparation, high power distance between managers/owners and subordinates, big gap in education levels between managers/owners and subordinates which prevented delegation of duties and lack of internal IT expertise within SMEs.

As explained in the earlier risks section, there was inadequate planning during ERP implementation and managers did not come up with business cases as part of the initial planning phase. They would have realised the need for developing a business case to justify their projects if they had been able to, but lack of IT expertise is typical of SMEs (Levy and Powell, 2000). Cant and Lightelm (2003:2) found that SMEs *“have no underlying appreciation of business fundamentals”*. They lack in professional experience and practical knowledge which hinders them from achieving their full potential (Cant and Lightelm, 2003; Chiliya and Roberts-Lombard, 2012).

4.8 Chapter 4 Summary

The purpose of the study was to explore ERP business case considerations for SMEs adopting ERP systems. In this chapter emerging benefits were presented, interpreted and discussed and summarised in Table 9. The resultant benefits and

causal benefits were also discussed. The researcher ranked the benefits and presented them in Table 11.

The study managed to successfully explore and identify all ERP risks. The researcher interpreted and discussed these risks and they are presented in Table 12. The causal and resultant risks are shown in Table 14.

Chapter 4 also discussed the cost elements which were evident in SMEs. These are summarised in Table 15. Generally, the study managed to successfully synthesise ERP business case considerations in SMEs. However, the researcher admits that the study had its limitations and challenges. The next section outlines these limitations.

4.8 Challenges and limitations of the study

The analysis indicated that the participants had more difficulty in identifying the benefits they realised than the challenges they faced. Since none of the SMEs did an ERP implementation outcome evaluation, identifying the benefits and the business value realised from an ERP system was a challenge to the SMEs. Schubert and Williams' (2009, p 355) stated that, "*realizing business value and identifying the benefits arising from implementations of enterprise systems remains a significant challenge for both research and practice*". This is exacerbated by the fact that some of the benefits which organisations realise are intangible and difficult to measure (Hares and Royle, 1994). Thus, SMEs may not be able to explicitly pin point such benefits.

Also, the participants struggled to explicitly differentiate expected risks from unexpected risks that had been realised. The same situation applied to benefits. As a result research question 4 was not fully answered as was expected by the researcher.

Since the participants were asked to participate in the study on a voluntary basis, only a few were willing to take part in the study. An invitation letter was sent to quite a number of potential participants but only a few responded. The low response rate was due to a lack of trust and willingness to participate.

Due to time constraints and the scope of the study, the interviews did not reach a saturation point. Generally, a case study strategy requires more time (Yin, 2009). Thus more work is required on the phenomenon under investigation. The findings were also not sent back to the participants for confirmation. Although the results were triangulated with the literature, this method could have brought better results.

Chapter 5: Conclusion and further research

The goal of this chapter is to present the conclusions drawn from the study. The research questions will be revisited to draw conclusions from the study. Finally, this chapter outlines further research recommendations.

5.1 Conclusions

5.1.1 How is the ERP business case developed in SMEs?

The aim of the study was to understand how SMEs develop their ERP business cases. The multiple case study approach has allowed current practises around ERP system business case development to emerge. The findings show that although SMEs know what they want to achieve when they implement ERP systems, there is lack of documentation of ERP business cases. From the sampled cases, it was found that ERP investments are not fully justified through the development of a business case. Rather, ERP projects were driven by a few targeted benefits known to SMEs. The benefits were not written down upfront to be used in future to evaluate the success of the project.

Also, the majority of the sampled cases did not identify and document any potential risks that were associated with the adoption of an ERP system. However, this practice was distinctly evident in SMEs investigated despite the fact that building a business case for IT investments has become a common practice in larger organisations as argued by Eckartz et al., (2009) and Ward et al., (2008).

If the managers/owners are responsible for everything that happens in SMEs and are the only ones who know the day to day running of the company, the question which arises is: for whom can an ERP Business Case document be developed for in an SME? The next section explains the factors which influenced the practice of not developing business cases among SMEs.

5.1.2 What influences current ERP system business case development practice in SMEs?

SMEs indicated their inability to build business cases. The SMEs sampled identified factors such as inadequate preparation and lack of resources such as manpower and time as the main causes of their failure to come up with business cases before investing in ERP systems. In addition, the CEO or MD was the only person who was fully aware of what was going on in terms of the day to day running of the business. This was exacerbated by high power distance which existed between managers/owners and subordinates. Also, there were big gaps in education levels between managers/owners and subordinates. As a result, delegating tasks to other employees to help in the development of business cases was not possible. This challenge was also compounded by insufficient internal expertise within SMEs.

5.1.3 What are the business case considerations for SMEs adopting ERP systems and how can SMEs adopting ERP systems develop realistic business cases?

1. Forecast a best-case scenario

SMEs adopting ERP systems can develop a realistic business case by devoting time and human resources to first creating a realistic best-case projection and documenting it. This can be achieved through considering the potential benefits. The potential benefits associated with the adoption of ERP systems in SMEs have been made available to SMEs upfront and are summarised in Table 9. The literature has also identified potential ERP benefits and these have been summarised Table 3. Similarly, ranked potential ERP benefits have also been made available to SMEs upfront and are summarised in Table 11. SMEs can deduce from the interdependency framework which benefits to prioritise in order to achieve resultant benefits. These compiled benefits will address the problem identified in literature by Ward et al., (2008) that organisations are unable to identify potential benefits upfront when building a business case.

2. Forecast a worst-case scenario

SMEs need to create a realistic worst-case projection. The worst case projection might comprise of potential ERP risks made available upfront and summarised in

Table 12. It was evident in this study that the majority of the risks realised were unexpected. Thus SMEs adopted a reactive approach to deal with the risks rather than being pro-active. SMEs can use the risk interdependency framework to predict hypothetical scenarios which they can base their business cases on. The literature also abounds with potential ERP implementation risks and these have also been summarised in Table 5.

The information which SMEs get from ERP vendors may not always be explicit in bringing out the most serious risks associated with ERP system adoption. As shown by this study, more risks than benefits emerged from the study suggesting that there is a high possibility that ERP vendors promote benefits over risks. As a result, there is need to consider the risks in detail.

3. Forecast expenses and revenues

SMEs need to start the adoption of ERP systems by forecasting business revenue and expenses. This will help to identify hidden benefits and risks. It was evident in this study that some SMEs, for example C2, did not expect revenue growth. Had they projected revenue growth the benefit could have been expected. The identified cost elements summarised in Tables 15 can be used by SMEs to estimate ERP project costs and to come up with projected budgets during the process of developing a business case.

5.1.4 How do benefits influence the realisation of other benefits?

The literature had identified significant ERP benefits. These are summarised in Table 3. However, it was important to understand how ERP benefits influence each other in the realisation process. Thus in this study, the process of how benefits manifest in each other was explored. Findings led to the conclusion that, among other isolated benefits, major resultant ERP benefits of a successful ERP implementation are sales increase; cost reduction and growth in revenue turnover and profitability.

Findings also led to the conclusion that major causal ERP benefits are internal data integration; information visibility; scalability and SCI and CRM. These had the highest number of dependencies and they are independent. Their realisation does not

depend on other benefits. Presumably, these should be targeted first in an implementation. Thus the researcher has concluded that these are the major benefits to be realised first during an ERP implementation so that other secondary benefits can successfully be realised. These findings help to provide evidence for the proposition that a successful ERP implementation is dependent on realising the casual benefits first in order to fully achieve the resultant benefits. To help explain these findings, an explanatory interdependency framework was derived from the study and is shown in Figure 11.

5.1.5 How do risks influence the realisation of other risks?

The literature identified significant ERP risks. These are summarised in Table 5. While relying on prior studies, it was important to elaborate on previous research by understanding how ERP risks influence each other. This study brings out the major resultant risks such as lack of information traceability and visibility; ERP re-implementation; lack of functionality fit in module; use of multiple systems and inadequate user involvement.

It was found that the major causal risks are: incorrect system setup; insufficient internal expertise; inadequate preparation; inadequate communication; lack of consultant skills; lack of vendor transparency and unclear or misunderstood changing requirements. These causal risks and resultant risks provide evidence for the proposition that a successful ERP implementation is dependent on identifying causal risks and successfully managing them to eliminate resultant risks. To help explain this, an explanatory interdependency framework was derived from the study and is shown in Figure 25. The major casual and resultant risks are discussed in section 4.5.6.1 and 4.5.6.2 respectively.

5.1.6 What is the gap between the expected benefits, costs and risks and the realised benefits, costs and risks?

To a greater extent the study has managed to identify benefits which SMEs expected and indeed realised. These are shown in Table 10. The most common benefits which the majority of SMEs expected and at the same time realised include internal data

integration; better information visibility; cycle time reduction and real time business intelligence.

ERP benefits which SMEs did not expect but realised include: IT infrastructure development; better organisational change and reduction of human errors. However, these were not the only unexpected benefits realised. There were other isolated incidents where various benefits were realised as shown in Table 10.

Since the majority of the SMEs did not forecast a best-case scenario, not many expected unrealised benefits emerged from the study. Only cost reduction was expected twice but was not realised. However, the benefit was expected and realised in 2 other companies and was realised unexpectedly in one other company.

The objective of this research question was to assist SMEs to identify ERP benefits which can potentially be difficult to realise. However, since the majority of the SMEs did not document any expected benefits, identifying benefits which are difficult to achieve through identifying expected unrealised benefits was not entirely possible as was expected by the researcher. However, benefits which may be difficult to realise emerged from the benefits interdependency framework and are shown in Table 11. These include sales increase; cost reduction revenue and growth and profitability. This is because these benefits rely on many other benefits to be achieved first before them as stated earlier.

The original plan was to compare what was expected but not realised with what the framework produce. For instance, cost reduction emerged as an expected unrealised benefit in 2 organisations. To complement this finding, cost reduction also depends on several other benefits such as internal data integration; better information visibility; e-commerce; SCI and CRM; scalability and improved stock and financial control to fully achieve it. Thus failure to fully achieve these pre-required benefits may result in failure to achieve cost reduction. As a result, the benefit may not be easy to achieve. Therefore, it was concluded that cost reduction is a difficult benefit to achieve. The researcher had been looking forward to establishing this kind of relationship.

The scenario with risks echoed that with benefits. SMEs did not forecast a worst-case scenario. As a result, the majority of risks which SMEs realised were unexpected as shown in Table 13. Only 4 companies predicted ineffective system change over. Two of the companies realised the risk and the remaining 2 did not. The rest of the risks which emerged from this study were unexpected risks and were not predicted. Thus the gap between expected risks and unexpected risks could not be fully established.

The majority of SMEs did not do a forecast of their expenses and revenues. Also, they did not do formal budgets. As result, the majority could not explicitly point out whether they had spent more than what was expected and on which areas. However, some admitted to having spent more on hardware acquisition and implementation services costs. Also, due to how SMEs operate, this part of the research question could not be fully answered.

Having presented the conclusions drawn from the investigation, the next section outlines the expected contribution of the study to both industry practitioners and to the body of knowledge on this topic.

5.2 Expected contribution of the study

The practical contribution of the study is that SMEs adopting ERP systems may use the proposed ERP benefits, ERP risks and cost elements to build realistic business cases thereby increasing their chances of implementing ERP systems successfully. Velcu (2010) argues that if the pre-implementation phase of ERP implementation is done properly, the chances of having a successful ERP project are higher. The process of developing a business case is part of the ERP pre-implementation phase.

The benefits interdependency framework should help SMEs to clearly establish the causal relationships which exist between benefits. This should help SMEs to manage and maximise benefits. They can use the framework to identify those benefits to target first in order to achieve resultant benefits. Similarly, the risk interdependency framework would also assist SMEs to establish the causal relationships which exist between risks.

The risk interdependency framework introduces a logical solution applicable to the root causes and manifestation of ERP risks. Mitigating one risk may help to eliminate all other risks which depend on the casual risk. Aloini et al. (2007) argues that there are two approaches to be implemented during the risk management process. The first approach deals with eliminating risky situations and the second approach focuses on the management of risks after they have occurred. Thus the explanatory models help SMEs in the prevention of accumulative ERP risks; the understanding of how benefits can be maximised and risks reduced. The major casual and resultant risks have been in discussed in section 4.5.6.1 and 4.5.6.2. These will help SMEs to focus on major casual risks and to effectively manage their realisation. Consequently, SMEs could potentially incur fewer costs.

The findings of this study may provide a solution to pre implementation problems associated with the building of a realistic business case and may assist SME investors with decision making before investing in ERP systems. Also, it has been said several times that a large percentage of ERP projects fail. Although this was not the research's initial goal, this study tried to show some of the causes of failure.

Presumably, the findings of this study will provide the necessary information to assist SME managers to make more informed and robust decisions when developing a business case for an ERP system adoption. In a sense, the findings address the concern among companies that business cases do not really assist them to recognise and manage benefits during the ERP adoption process (Shanks et al., 2003). Lastly, the study lays a foundation for further research on the concept of business case considerations for SMEs adopting ERP systems.

Expected contribution to theory

According to Llewelyn (2003), everyone develops a theory. However, the theories are placed in different levels. This section discusses the theoretical contributions of the thesis in light of Llewelyn (2003) level four theory classification scheme. The fourth level of theorising explains “*social, organizational or individual phenomena in their settings*” Llewellyn (2003, p. 674).

A number of studies covering ERP systems have been given significant attention by both academia and practice (Haddara and Zach, 2011). Among those, several studies which focused on ERP benefits, risks and costs elements were conducted. Thus the existing literature abounds with ERP benefits, risks and cost elements from a general point of view, as discussed in Chapter 2. This study deviated from investigating overviews of ERP benefits, risks and cost elements and focused on investigating in detail how benefits influence each other and how risks influence each other. The findings were concluded in the context of SMEs operating in the manufacturing and distribution industry located in Sub-Saharan Africa who adopted ERP systems. This allowed the findings to provide a deeper understanding of ERP Business Case considerations in this domain.

The study brought out Sub-Saharan African context-specific issues within SMEs, such as insufficient internal expertise; lack of skilled ERP consultants, power distance which exist between managers or owners and subordinates, gaps in education levels between managers or owners and subordinates and inadequate hardware infrastructure. This may shed light on the challenges faced by practitioners operating in sub-Saharan Africa. The findings may also form the basis for a comparison between ERP projects carried out elsewhere in the world and Sub-Saharan Africa.

The study extended the current theories on ERP risk and benefits management and the realisation process through the development of a benefits interdependency framework and risk interdependency framework. The study will make a significant contribution to the body of knowledge on this topic. The next section outlines the recommendations for future research.

5.3 Future research recommendations

Future research can focus on validating the benefits interdependency framework; risk interdependency framework; resultant benefits, resultant risks, causal benefits, causal risks and the resultant ranking of the benefits and risks. This validation will enhance the development of better business cases within SMEs. Eisenhardt and

Graebner (2007) have emphasized the development of testable theoretical propositions.

Applying action research interactions or a design science approach might be useful to more deeply understand how business cases are developed in Sub-Saharan SMEs and to improve the business case artefacts. These may involve prolonged engagement and persistent observation of the phenomenon under investigation and thus a better theory may emerge.

Also, future research can focus on investigating how the realisation of certain ERP benefits can result in the elimination of certain risks and how the realisation of certain risks potentially hinders the realisation of certain benefits. Thus the focus should be on establishing the causal relationships between risks and benefits.

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Appendices

Appendix A: Cover letter



Department of Information Systems

Leslie Commerce Building
Engineering Mall, Upper Campus

OR Private Bag, Rondebosch 77001

Tel: 650-2261

Tel. Add: ALUMNI, Cape Town

Fax No: (021) 650-2280

Dear Participant

RE: Request for your participation in a Masters Dissertation research study

To fulfil the requirements of the Department of Information systems at University of Cape Town, I am carrying out an investigation on business case considerations for SMEs adopting ERP systems in South Africa. As part of the research process, I will be conducting qualitative interviews to get real insights of the issues surrounding the business case considerations.

The UCT ethics committee has already approved the interview questions. Participation in this investigation is voluntary. The results or findings of the research will be confidential and hence no third parties will be allowed to have access to it. The results will remain anonymous. However, if you want a copy of the findings they can be made available to you.

I welcome any questions or queries regarding the details of the investigation.

Yours faithfully

Carrington M. Mukwasi

Please, direct any queries to:

Research Student

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Department of Information Systems

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Prof. W. Chigona

Post-graduate Programme-Co-ordinator

Department of Information Systems

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Appendix B: Interview participation consent form

**Department of Information Systems**

Leslie Commerce Building, Engineering Mall, Upper Campus
OR Private Bag, Rondebosch 77001
Tel: (021) 650-2261
Fax No: (021) 650-2280

INTERVIEW PARTICIPATION CONSENT FORM

One of the partial requirements for completing a Master's degree in Information Systems at the Department of Information Systems in the Faculty of Commerce at the University of Cape Town is the completion of a dissertation research project.

The researcher, in this case Carrington Mugove Mukwasi, has chosen to perform a study entitled "Enterprise Resource Planning Business Case Considerations: An Analysis of Small to Medium-Sized Enterprises in Developing Countries".

The research objectives of this study are to determine:

1. To explore benefits, costs and risks that SMEs expected to realise prior to an ERP implementation.
2. *To explore benefits, costs and risks that were actually realised after the implementation of an ERP system.*
3. *To explore which benefits, costs and risks were realised unexpectedly*
4. *To establish how benefits influence the realisation of other benefits.*
5. *To develop an explanatory model of how benefits influence each other.*
6. *To establish how risks influence the realisation of other risks.*
7. *To develop an explanatory model of how risks influence each other.*
8. *To explain the current ERP system business case development practice in SMEs.*

An issue that is of utmost importance to the researcher, the department, the faculty and the University of Cape Town at large is research ethics. Consequently, the researcher guarantees anonymity of the details and comments you provide, which will strictly be used for the sole purpose of the aforementioned research report.

Furthermore, your participation in this study is entirely voluntary. You may choose to be excluded from the study at any point in time without incurring any adverse consequences. If you so choose to be involved with this research project, please sign the consent form below.

Carrington M. Mukwasi
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Dr. Lisa Seymour
Supervisor
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UCT – Department of Information Systems
Phone: (021) 650 4259

PARTICIPANT CONSENT FORM

By signing this participant consent form, you are agreeing to participate in this research project. Should you wish to contact the researcher for any reasons whatsoever, please do not hesitate to email him or call him.

Contact Name: _____ Signature _____ Date: _____

Appendix C: Interview question sheet

These questions are a guide to the questions asked during the interview sessions. The responses may probe further questioning depending with the data being obtained.

1. Questions about company profile

1	What is your designation?
2	For how long have you been employed with the company?
3	According to 1996 Small Business Act of South Africa, are you classified as Small to Medium-sized Enterprise or Large Enterprise (LE)?
4	How many employees does your company have?
5	What is your annual revenue turnover?
6	Does your company have subsidiaries or are you a subsidiary of any company?
7	Does your company have branches in South Africa and or outside South Africa?
8	In brief, what does your company do (The Company's line of business or specialisation?)

2. Questions about the Enterprise Resource Planning (ERP) system

1	Which ERP system do you use?
2	How many users use the ERP system?
3	For how long has the ERP system been in use?
4	Did your company develop a business case prior to adopting the ERP system? If yes, what factors did you consider before adopting the ERP system? May I have a copy of the business case document? Were you part of the team which developed ERP business case?
5	If no, how was the ERP project justified?
6	What was the ERP's design objective? Did the ERP accomplish its objective?
7	What were the challenges faced to achieve or not to achieve the objective? What were the success drivers?

3. Questions about the ERP and its fit into the business context

1	Can you describe your firm's external environment and explain how the ERP system fit into this external environment?
2	Can you describe your firm's internal environment and explain how the ERP system fit this

	internal environment?
3	Can you describe your firm's strategy and explain how the ERP system fit the firm's Strategy?
4	Can you describe your company's organisational structure and culture and explain how the ERP system fit in this organisational structure and culture?
5	Can you describe the business processes of your company and explain how the ERP system fit in the company's business processes?
6	Does the organisation's IT infrastructure fully support the ERP system?

4. Questions about the ERP business case considerations during the pre-implementation phase

1	What were your expected initial benefits when you adopted the ERP?
2	Of those benefits you expected, how much were actually realised?
3	Explain any unexpected benefits that were realised.
4	What factors and processes might have contributed to the results obtained?
5	What were your expected initial costs for implementing an ERP?
6	Of these cost items which costs were higher or lower than initially predicted?
7	What factors and processes influenced these differences?
8	What were your predicted potential risks associated with the adoption of an ERP system?
9	Describe those foreseeable risks that actually happened?
10	Explain any unforeseeable risks that your company experienced.

5. Concluding Questions

1	Basing on your ERP experience, what do you advise other SMEs who are developing a business case for adopting an ERP system? What do you advise them to be cautious of?
2	Do you have any questions for me?

The firm's **external environment** may be related to: customers, competitors, market trends, suppliers, new technology, economic environment, political and regulatory environment.

The firm's **internal environment** may be related to: company image, operational efficiency, operational capacity, market share, financial resources

Firm's strategy describes how a particular firm intends to succeed in its chosen market place against its competitors. It therefore represents the best attempt that the management can make at defining

and securing the future of that business. (Is the *direction* and *scope* of an organisation over the *long-term*)

Organizational culture: The set of the set of beliefs, values, and norms, together with symbols like dramatized events and personalities that represent the unique character of an organization, and provides the context for action in it and by it. Beliefs and values are words that will pop up frequently in other definitions, as well. Norms might be described as traditions, structure of authority, or routines.

A **business process** is a collection of related, structured activities or tasks that produce a specific service or product (serve a particular goal) for a particular customer or customers. It often can be visualized with a flowchart as a sequence of activities.

Appendix D: Sample of transcribed interview (Interview 2)

(...) [Some text removed]

Interviewer: (...). Which ERP system do you use?

Respondent 2: For what? I use a lot of systems. For accounting I use Alpha, for CRM I use Sales Force. Com.

Interviewer: Ok. Why do you have to use 2 systems? Does that mean Alpha does not have a CRM module?

Respondent 2: Alpha has a CRM module built in but it's not good enough.

Interviewer: What do you mean by saying it is not good enough?

Respondent 2: It is even elementary. (...)The CRM in Alpha is for Kids.

Interviewer: Did you consider customising the one in Alpha?

Respondent 2: Yes, I did but still it did not work.

Interviewer: Not to your standard? What is it that you cannot do with Alpha?

Respondent 2: What you cannot do is; if you lock an opportunity you cannot record the products. The only way you can record the products is if you do a quotation and at the moment there are just like thousands of quotations open in the system because of that. So that does not work for us.

(...) [Some text has been removed for confidentiality purposes]

Interviewer: What were the challenges you faced to achieve your objectives?

Respondent 2: We faced a lot of challenges. Number one, the data could not be imported because it was so old, it had to be manually adjusted; every single customer in excel because Beta didn't export into excel but it exported into delimited files. It was a lot of work. Also at the time in April 2006 there were not many Alpha qualified uuh, what do you call them?

Interviewer: ALPHA Consultants

Respondent 2: Yes, qualified Alpha consultants, Alpha was brand new so there was a skills issue. As part of our implementation, the company that did our implementation BASHA, had like three four people who were training as well at the same time doing our installation. They were being trained and doing the job at the same time so obviously there were few errors made and few lessons learnt you know because the skills were not there. That was a bit of a problem.

Appendix E: Sample of coding sheet (Respondent 2, C2)

Interview Code: 2	Theme	Low level Category	High Level Category	Status	Links	Text
	Lack of functionality fit in module	Risk	Inadequate software systems design	Unexpected Realised Risk		Alpha OMEGA has a CRM module built in but it's not good enough.
	Lack of functionality fit in module	Risk	Inadequate software systems design	Unexpected Realised Risk		...The CRM in Alpha is for Kids. (...) Not only that, it's even elementary.
	Poor data migration	Risk	Inadequate management strategy and skills	Unexpected Realised Risk		...but the data was old in DOS you could not migrate it over to the new system. The data had to be exported in excel and re-imported anywhere.,
	Real time business intelligence	Benefit	Managerial Benefit	ERP Design Objective	Visibility of information	Basically we wanted a live system; we wanted live information, live reporting.
	Real time business intelligence	Benefit	Managerial Benefit	ERP Design Objective		.. Live information, we craved live information and we got it (emphasising).

Appendix F: List of acronyms

BC	Business Case
B2B	Business-to Business
B2C	Business-to-Consumer
BPR	Business Process Re-engineering
CRM	Customer Relationship Management
DBMS	Database Management System
EC	European Commission
ERPs	Enterprise Resource Planning systems
E-Commerce	Electronic Commerce
GDP	Gross Domestic Product
HR	Human Resources
IT	Information Technology
LEs	Large Enterprises
OECD	Organisation for Economic Co-Operation and Development
RDM	Risk Diagnosing Methodology
ROI	Return On Investment
SCI	Supply Chain Integration
SMEs	Small to Medium Sized Enterprises
SMME	Small, Micro and Medium Enterprises

VPN

Virtual Private Network